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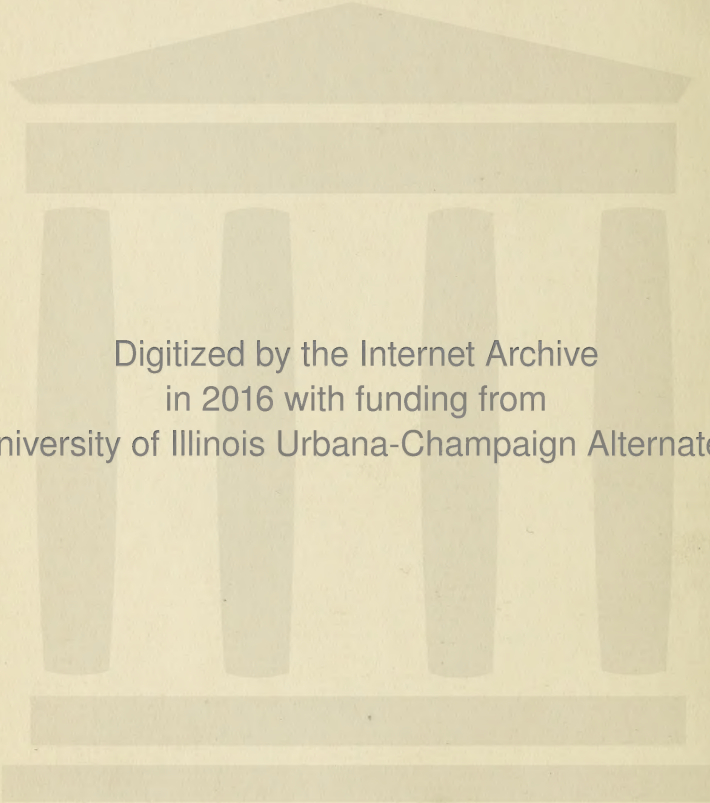
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TRAINING OF TEACHERS OF ELEMENTARY AND SECONDARY MATHEMATICS

INTERNATIONAL COMMISSION ON THE TEACHING
OF MATHEMATICS

THE AMERICAN REPORT

COMMITTEE No. V.



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THE AMERICAN REPORT.

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¹ As originally arranged, the chairman of the committee undertaking this investigation was Prof. George W. Myers, of the University of Chicago. On account of his absence in Europe for the year, his place was taken by Prof. Clifford B. Upton, of Teachers College, Columbia University, New York, N. Y. A part of the report as prepared by him and the rest of the committee appeared in its first form in the *Educational Review*, April, 1911.

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TRAINING OF TEACHERS OF ELEMENTARY AND SECONDARY MATHEMATICS

SUBCOMMITTEE 1.¹ THE TRAINING OF TEACHERS OF MATHEMATICS IN PROFESSIONAL SCHOOLS OF COL- LEGIATE GRADE, SEPARATE FROM OR CONNECTED WITH COLLEGES OR UNIVERSITIES.

Twenty years ago no professional training of university grade existed in this country to prepare teachers of mathematics for secondary schools. At that time the young teacher's sole preparation for his work was the taking of as many academic courses in mathematics as possible, plus, in some instances, a course on the history of education or some lectures on general pedagogy. On graduation he had had no observation of skillful teaching in secondary mathematics, no practice work, no survey of secondary mathematics from a higher and pedagogic standpoint, and no knowledge of the best literature dealing with the teaching of algebra and geometry in this country or abroad. He gained all his experience in the classroom, and, if progressive, he also acquired a certain pedagogic equipment from private reading and from teachers' associations; if not, his point of view on questions of teaching remained narrow, as is always the case when one fails to come into contact with what others are doing in his field of work. A very large number of candidates for teaching begin their work to-day with this modicum of preparation.

About 15 years ago we find conditions throughout the country beginning to change in this respect. At least five different educational institutions² had by this time established courses on the teaching of algebra and geometry, which, together with a course on general pedagogy, formed a certain professional training for high-school teaching in mathematics. Up to 1900 only four other colleges³ are

¹ No report of the committee as a whole has been prepared, the ground being covered sufficiently well by the reports of the subcommittees that are presented herewith.

² University of Michigan (1893), Michigan State Normal College (1893), Teachers College, Columbia University (1894), Syracuse University (1895), and University of Chicago (1895). The dates indicate the year in which the course was first given.

³ University of Pennsylvania (1897), University of Indiana (1898), Albany Normal College (1898), and University of Illinois (1900).

known to this committee to have added courses on the pedagogy of secondary mathematics to their programs.

The past 10 years have shown far greater interest in pedagogical matters and a much more rapid growth in courses of this kind. At present about 25 other colleges,¹ in addition to those above mentioned, have developed such courses as "The history and pedagogy of secondary mathematics," "The teaching of mathematics in secondary schools," and "Teachers' course in algebra and geometry."

For the other high-school studies, such as Latin, English, German, physics, and chemistry, there has been a corresponding development of professional courses on the teaching of these subjects.

This general interest in the professional preparation of teachers for secondary education, which is thus being shown in many of our American colleges and universities, has led to a feeling on the part of a number of these institutions that teaching must be recognized as a profession, and that training for it must be as formal and definite as for law, medicine, or engineering. This has resulted in the establishment at a number of our universities of schools of education, each with a formal organization and a separate faculty, these being considered as professional schools and as such ranking, in general, with the schools of law, medicine, and engineering. In these schools attention has been given particularly to preparation for secondary teaching, as the various State normal schools have, in general, solved the problem of preparing teachers for the elementary schools.

Of the various schools of education now existing in the United States the oldest are Teachers College of Columbia University and the School of Pedagogy of New York University. Teachers College was founded in 1888 as a privately endowed institution under the presidency of Nicholas Murray Butler, and was then known as the New York College for the Training of Teachers. It was a school of university grade and enjoyed reciprocal relations with Columbia University. In 1898 it became one of the professional schools of Columbia University, ranking with the schools of law, medicine, and engineering. Teachers College was the first professional college of education of university grade separate from a university, though now a part of Columbia University.

The School of Pedagogy of New York University, established in 1890, takes rank with the other professional schools of that institution, and may be said to be the first professional school of university grade directly connected with a university.

¹ Eleven of the more prominent are: New York University (1902), University of Texas (1903), University of Missouri (1903), University of Minnesota (1905), University of Cincinnati (1906), University of Nebraska (1907), Cornell University (1907), University of Wisconsin (1907), University of Iowa (1908), Drake University (1908), and Ohio State University (1909).

In 1901 a school of education with a distinct faculty and ranking as a professional school was opened at the University of Chicago, and has since become one of the prominent institutions of this kind. Within the last five years at least 11 other universities¹ have organized similar schools or colleges where the professional training of teachers is carried on. In all but two cases² these schools rank with the other professional schools of the university.

In addition to the above-mentioned institutions connected with universities there are at least three normal colleges,³ separate from any university or college, where work in the training of teachers is of collegiate grade and leads to a recognized bachelor's degree. These three institutions offer both academic and professional courses in preparation for secondary teaching.

The work in all of the above schools or colleges of education differs from that offered by a university chair or department of education in that professional courses of study are offered in far more generous measure. In these schools one finds courses in general and educational psychology, the history and philosophy of education, school administration, foreign school systems, secondary education, etc., in addition to courses on the teaching of each of the secondary subjects, often accompanied by systematic observation and practice teaching of the subject under expert supervision in some high school. The academic preparation of the prospective teacher is usually carried on for two years in the regular college department of the university before the pupil enters the school of education, and is continued in the college department along with the professional courses in the school of education. In general, academic work is not done in the school of education, the courses there offered being strictly of a professional nature. The principal exception to this is found in those professional schools which are not connected with a university. In all of these schools the professional courses are credited toward the bachelor's degree, and in a few of these institutions graduate courses leading to the master's and doctor's degrees in education are also offered.

¹ University of Cincinnati, College for Teachers (1905); University of Texas, Department of Education (1906); Syracuse University, Teachers' College (1906); University of Missouri, School of Education (1906); University of Minnesota, College of Education (1906); University of Indiana, School of Education (1907); Ohio State University, College of Education (1907); University of Iowa, School of Education (1907); Drake University, College of Education (1907); University of Illinois, School of Education (1908); University of Nebraska, Teachers' College (1909).

(The dates indicate the year of establishment of the school of education. By a comparison of the above with the footnotes on pages 5 and 6 it will be seen that in some universities courses on the teaching of secondary mathematics existed before the organization of a formal school of education, while in others such courses came after the establishment of the professional school.)

² Universities of Illinois and Iowa.

³ State Normal College, Ypsilanti, Mich.; State Normal College, Albany, N. Y., and Normal College of the City of New York.

It is the purpose of this report to deal only with the training of teachers of mathematics as carried on in the above-mentioned schools or college of education.

THE AIM OF SCHOOLS AND COLLEGES OF EDUCATION.

So far as mathematics is concerned, it is the aim of all of these colleges of education to prepare teachers and supervisors of mathematics for public and private high schools. Some of these institutions also have facilities for equipping teachers of mathematics for departmental work in elementary schools and instructors in methods in mathematics for normal schools. At a few schools of education opportunity is offered to principals and teachers to fit themselves for the study of special problems in the teaching of mathematics, such as constructing courses of study for elementary and high schools, and especially courses in mathematics which fill the particular needs of manual training, commercial, industrial, trade, and other specialized forms of schools. The courses found in several of these professional schools are very helpful to those preparing to teach academic courses in mathematics in colleges and universities, while extensive and complete preparation is possible for those who wish to become professors of the pedagogy of mathematics. Facilities are also offered to prepare for research and teaching in the history of mathematics.

THE PRESENT UNDERGRADUATE PROFESSIONAL PREPARATION FOR TEACHING IN SECONDARY SCHOOLS.

In each of the 17 schools of education considered in this report the minimum training of a professional nature for secondary work is a definitely organized course on the teaching of secondary mathematics. This course varies in length from 17 to 90 hours of class work, the average for all of the institutions being 48 hours. The method of handling the course is, in general, by lectures, recitations on assigned readings, discussions, written reports, and quizzes. The subject-matter of this course varies somewhat in each institution, though certain topics are common to practically all of the courses. That some notion may be formed of what is being done in such work the following composite syllabus, prepared from the syllabi sent in by the leading institutions, has been arranged, and may, therefore, be regarded as a sort of maximum course. The course treats of such topics as the reasons for teaching algebra and geometry, the historical development of these subjects and of the methods of presenting them, the world's best literature concerning the teaching of mathematics, the mathematical curriculum in American and foreign secondary schools, the adaptation of a curriculum to the needs of

various types of schools, a study of typical American and foreign texts for secondary schools, and the various movements to reform the teaching of secondary mathematics at home and abroad. Some attention is often given to the methods of conducting a recitation in mathematics with discussions of the heuristic method, the laboratory method, the no-text method, etc. The course also contains a review of typical parts of algebra and geometry offering scientific or pedagogic difficulties, such as the number system of algebra, equivalent equations, factoring, theory of exponents, simultaneous quadratic equations, graphic solutions, the foundations of geometry, the sequence of propositions, the treatment of parallels, loci, limits, incommensurable cases, methods of attacking exercises in geometry, and the nature of the problems and exercises of algebra and geometry. The reading of current periodical literature on the teaching of mathematics and the discussion of such topics as teaching algebra and geometry together, the fusion of plane and solid geometry, etc., are often included.

Such books as Smith's *The Teaching of Elementary Mathematics* and *The Teaching of Geometry*, and Young's *The Teaching of Mathematics* are frequently used as outlines or texts for such a course. Fine's *College Algebra and Number System of Algebra*, Chrystal's *Algebra*, and the histories of mathematics by Ball, Fink, Cajori, Gow, and Allman are frequently reported as reference books.

The prerequisites in mathematics for the above course are one year of college mathematics in about half of the cases and through the calculus in others. Even where the former requirement exists, it usually happens that most of the students have had the calculus and such courses as the theory of equations and projective geometry as a minimum preparation before entering the pedagogical course. This pedagogical course is normally taken in the senior year.

In connection with the above course on the teaching of secondary mathematics 12 different colleges of education offer systematic work in observation and practice teaching in secondary classes, which receives academic credit. This work is carried on in most cases in a special high school connected with or under the direction of the school of education. In a few cases arrangements are made for such practical work in public city high schools. The amount of observation and practice teaching required varies from 30 to 60 hours of work.

In some of these colleges other professional courses in preparation for the teaching of mathematics are given in addition to the teachers' course above mentioned. A distinct and separate course on the history of mathematics is offered in seven of these institutions, while in several others such historical work is a definite part of the course on the teaching of mathematics. This historical course aims particu-

larly to show the evolution of the science of mathematics and to trace the causes which have led to its development or stagnation in various epochs. Work in surveying, designed especially for prospective teachers, is also offered at several schools. At Teachers College of Columbia University and at the School of Education of Chicago University several additional interesting professional courses are found, such as "Encyclopedia of elementary mathematics for teachers," "Applied mathematics for teachers in secondary schools," "Psychology of number," "Teaching of secondary mathematics in Europe," and "Critical review of secondary mathematics."

In a few schools special certificates or diplomas, certifying special preparation and fitness for teaching secondary mathematics, are given in addition to the regular degree to students who fulfill certain requirements. In some instances these diplomas are granted by the State board of education to students who have had at the school of education a certain preparation for the teaching of mathematics. In these cases the diploma is a State license to teach for life or for a given number of years. In other instances the diploma is conferred only by the college of education independent of any board of education. The requirements for these diplomas are usually as follows: Courses on educational psychology, the history of education, and the teaching of secondary mathematics, with observation and practice teaching, together with academic work in college mathematics of from 15 to 24 points (a point equaling one hour of work for one semester).

THE PRESENT UNDERGRADUATE PROFESSIONAL PREPARATION FOR TEACHING IN ELEMENTARY SCHOOLS.

Only a few ¹ of the schools of education offer preparation for teaching mathematics in elementary schools. One reason for this is that the State normal schools offer, as a rule, sufficient preparation for this field of work. When, however, one wishes to prepare for supervision or departmental work in mathematics in the grades, and hopes to obtain the better positions, it is necessary to have further scholarship in mathematics and education, and a college degree, a type of training which can be found only in the colleges for teachers since they begin, in general, where the normal schools leave off. Students who have done two years of work beyond the high school, in a normal school, are usually able to complete a course and obtain a degree in one of the schools of education by two additional years of study. A part of the preparation for work in the elementary schools is a course on the teaching of arithmetic corresponding to the one described above on the teaching of algebra and geometry. The syllabus

¹ Teachers College of Columbia University, School of Education of the University of Chicago, College for Teachers of the University of Cincinnati, Albany Normal College, and the Michigan State Normal College.

is of the same general type as that for secondary mathematics, except that arithmetic and such parts of algebra and concrete geometry as are taught in the elementary school make up the subject matter for discussion. Students taking such a course have often had a year's work in college mathematics, while the most serious students have usually had more. In Teachers College at Columbia University students also take a thorough course on higher arithmetic, in which special attention is given to modern business practices. In the School of Education of the University of Chicago a course on the psychology of number is usually taken. In addition, students generally elect very freely related courses in the departments of psychology and elementary education. Opportunity for practice teaching and observation in elementary mathematics is offered in connection with this work. It should be added that students who are studying seriously the problems of teaching mathematics in elementary schools usually take also the full preparation for teaching in secondary schools, in order that they may better appreciate the nature of the secondary school work to which the elementary school courses are leading.

GRADUATE COURSES IN THE TEACHING AND HISTORY OF MATHEMATICS.

Graduate courses in the teaching and history of mathematics, leading to the master's and doctor's degrees, are found only at Teachers College of Columbia University and at the School of Education of the University of Chicago. In these two institutions research courses are conducted on the seminar plan, in which the students work on individual topics relating to the history and pedagogy of mathematics. The prerequisite for these courses is a bachelor's degree, which should include a course on the teaching of algebra and geometry in addition to a generous amount of college mathematics. Students who have not had courses on the history and pedagogy of secondary mathematics usually take these courses parallel with the graduate work. A large number of the students pursuing these courses are those who have already had considerable experience in teaching. The work is adapted to the needs of the various classes of students. It is taken by those who wish further preparation for secondary teaching as well as by those who aim to become heads of departments of mathematics in high schools. One also finds a number who are fitting themselves to teach methods in mathematics in normal and training schools.

There are also a few students who are preparing to teach mathematics in colleges and universities. This seems to be a good omen, for it indicates that students are beginning to realize that there are important pedagogical problems to be solved, especially in connection with the teaching of the first year of college mathematics, where,

in general, more poor instruction is found than in any other place in our educational system, a situation which is easily explained, since as a rule the teachers in the first year of the college course are young men, fresh from the study of higher mathematics, who have never had experience in teaching and who have never so much as discussed the most elementary topic in relation to such work. The fact that the men who are preparing in the schools of education for this college work usually follow at the same time the courses offered on the teaching of secondary mathematics shows that they realize that the problems of teaching in the first years of college are almost identical with those in the last two years of the high school. France and Germany long ago fully appreciated this when they included in the courses of study for their secondary schools the mathematics which we usually teach in the first two college years. The further fact that these young men also pursue as many advanced courses as possible in pure and applied mathematics indicates that they feel strongly the necessity of combining mathematical scholarship with this pedagogic training. In these schools of education there is no dogmatic instruction in reference to college teaching; such work would be fatal. In the seminars these students usually work out some problem connected with freshman or sophomore college work and, at the same time, get fully into touch with all of the movements and problems in secondary teaching which bear so directly upon their field of work. They thus obtain a broad basis for the pedagogy of freshman college mathematics; they get perspective if nothing else.

In these graduate courses men are also prepared for college teaching and research in the history of mathematics. The facilities for this work are exceptional at Teachers College of Columbia University, where very complete libraries¹ of old mathematical books and manuscripts are available for the use of graduate students. In the seminars one also finds a number of principals and supervisors who are interested in the new types of industrial, trade, and commercial schools, which are so rapidly springing up in this country, and who are working on special studies relative to the courses of study in mathematics adapted to the needs of these schools.

PRESENT TENDENCIES.

A number of the schools of education report plans for enlarging the work for the professional training of teachers of mathematics. In several of these colleges where short courses on the teaching of secondary mathematics are now offered it is proposed to make within a year or so a considerable increase in the length of the course. In a few institutions where no practice teaching or observation is now

¹ The large private libraries of Prof. David Eugene Smith and George A. Plimpton, Esq.

given, it is hoped to mature arrangements for such work in the near future. In a number of other schools serious efforts are being made to increase the efficiency of this work, especially on the side of practice teaching.¹ Several professors have also announced their intention of offering courses on the history of mathematics; others are planning graduate courses in the teaching of mathematics. At several of our colleges of education there seems to be a strong feeling that secondary teachers should have a synoptic course in mathematics somewhat along the lines of Klein's "Elementarmathematik vom höheren Standpunkte aus." There is no question as to the advisability of such a course; the main reason why such work has not been more generally given in America is probably the lack of a suitable textbook. As a number of American professors are now jointly preparing a work of this kind, courses of this nature will soon be found, no doubt, in a number of our teachers' colleges.

CONCLUDING REMARKS.

The ideal preparation for teaching in secondary schools and the first two years of college should be something more complete than that now generally found. On the side of scholarship it should approach the completeness of the preparation in France and Germany, where one must have a State license, obtained only by passing a most rigid State examination, before he can hope to do anything worth while in secondary teaching. On the other hand, it would probably be detrimental to the life and elasticity of our system if a similar license should be demanded in this country. Yet with us, where the public is now beginning to recognize that teaching is a profession, a feeling which will certainly increase as the years go by, the time will undoubtedly come when secondary teaching will be sufficiently attractive financially to enable us to demand from the prospective teacher some such preparation as the following: On the side of pure mathematics we may expect the calculus, differential equations, solid analytic geometry, projective geometry, theory of equations, theory of functions, theory of curves and surfaces, theory of numbers, and some group theory. On the applied side we should demand a strong course in mechanics, theoretical and practical astronomy, descriptive geometry, and some mathematical physics with a thorough course in experimental physics. To this should be added special courses on surveying and general applications of mathematics that the student may see to what all of the above work is leading. As pedagogical training there should be included a strong course on

¹ An interesting article on "Practice work in university departments of education," by F. E. Farrington, has recently appeared in the Bulletin of the University of Texas, No. 134, Nov. 1, 1909. It may also be found in the Publications of the National Society of College Teachers of Education for 1909.

the teaching of secondary mathematics with observation and practice teaching under expert supervision, a course on the history of mathematics, at least one graduate course on the history and teaching of mathematics, and a course of an encyclopedic nature dealing critically with the field of elementary mathematics from the higher standpoint. A foundation in psychology and the history of education is also necessary. Such a preparation may at first seem excessive, but it is the ideal, and, with the exception of about half of the pedagogic training outlined, it is no more severe than the requirements in France to-day for the secondary teaching license known as the "agrégation." We can demand this if the public will give teaching the recognition it deserves.

SUBCOMMITTEE 2. STATE NORMAL SCHOOLS.

The State normal schools exist for the purpose of training teachers for the public schools. They are generally supported by appropriations by the State legislatures. A small number of these schools are supported by a specified State tax, supplemented by appropriations by the State legislatures, and in a few cases they receive some income from the sale or rental of public-land grants. A few State normal schools have small permanent endowments. Tuition is free, except for slight incidental fees, to persons declaring an intention to teach in the State in which the school is located. With the exception of a few schools in the South the State normal schools are coeducational.

This report is prepared from data obtained from the catalogues of State normal schools, and from the answers to questionnaires. A questionnaire was sent to each of 185 State normal schools and to 8 city training schools. Answers were received from 65 State normal schools and from 3 city training schools. The number of city training schools from which data were received being small, these schools have been classed with the State normal schools.

THE RELATION OF NORMAL SCHOOLS TO OTHER SCHOOLS.

The requirements for entrance to normal schools vary in different parts of the country. Of 64 schools reporting on this topic, 23 per cent require high-school graduation. The majority of these schools are in New England and New York, and offer a two-year course of study, which is composed largely of professional work. The remaining schools require for admission only the completion of the work of the eighth grade. Such schools usually offer two courses of study, a four-year course for the students who have completed only the work of the eighth grade and a two-year course for high-school graduates. A few schools, chiefly in the Middle West, offer two

ERRATUM.

The sentence beginning on the seventh line from the bottom of page 15 should read as follows: Of the schools reporting, 89 per cent give courses in methods of teaching arithmetic and 9 per cent give courses in methods of teaching algebra and geometry.

years of work in addition to the above courses, for the completion of which a bachelor's degree is granted.

The work of the normal schools now receives better recognition from the colleges than formerly. Of the schools reporting to this committee 56 per cent receive full credit in the colleges for work done in mathematics, and 20 per cent receive partial credit. Frequently the colleges allow junior-class standing to those graduates of the normal schools who have done two years of work beyond the high school. It is estimated that about 13 per cent of the graduates of the normal schools later pursue advanced work in college. The larger estimates come from the West, where the normal schools are used as preparatory schools by a considerable number of students from the rural districts, because the high schools are not so well developed as those in the East. Since a considerable number of their graduates later go to college, the normal schools of this section have come to offer considerable elective work. It thus becomes possible for the student to do in the normal schools the mathematics usually done in the first two years in college.

Practically all normal-school graduates teach at some time in the public schools. It is estimated that 73 per cent of the graduates teach five years or more. The large majority of them teach in the grades. Sixty-four per cent of the schools report that some of their graduates teach in the high schools in the smaller cities and towns.

THE AIM OF THE INSTRUCTION IN MATHEMATICS.

Each school was asked to give the aim of the instruction in mathematics. Of the schools reporting on this question, 51 per cent claim to pay equal attention to mathematics as a science (the so-called culture value) and to mathematics as an art (the so-called utilitarian value). About 28 per cent claim to emphasize more the culture aspect (except in arithmetic), and 21 per cent put greater stress upon the utilities.

Since a large majority of the students are preparing to teach in the elementary schools, arithmetic is the most important subject in the mathematical curriculum of the normal school. The mathematical instruction has as its chief aim the preparation of efficient teachers of arithmetic. One means used to accomplish this end is to give formal instruction in methods of teaching this subject. Of the schools reporting, 89 per cent also give courses in methods of teaching algebra and geometry. The general opinion is that such courses are distinctly valuable when preceded by a thorough grounding in the subject matter. In 66 per cent of the schools offering these courses they are given wholly, and in 8 per cent in part, by the same teachers that give the academic courses in mathematics.

It is the opinion in 23 per cent of the schools that there should be no difference, except in courses in methods, in the instruction in mathematics offered to students preparing to teach and to other students. The remaining schools take the point of view that in courses for prospective teachers more attention should be paid to the aims in teaching mathematics, to methods of explanation and orderly presentation, and to the historical development and economic importance of the subject.

METHODS OF INSTRUCTION AND BRANCHES OF STUDY.

The courses of study in 64 schools were obtained either from answers to questionnaires or from the catalogues of the schools. The following table shows the different courses given, the number of schools offering each course, and the average number of hours given to each course:

Subject.	Number of schools.	Average number of hours.
Arithmetic.....	All.	100
Elementary algebra.....	All.	171
Plane geometry	All.	143
Advanced algebra	9	108
Solid geometry	18	72
Methods of teaching	32	63
Mathematics		
Plane trigonometry	40	77
Spherical trigonometry.....	4	80
Analytics	25	96
Calculus	23	87
Theory of equations	3	52
Differential equations	1	48
Surveying.....	11	57
Analytical mechanics	1	48
History of mathematics	8	70

High-school graduates taking a two-year course in a normal school are required to review arithmetic, and, in some schools, algebra and geometry. Students who enter the normal school from the eighth grade are required to take courses in arithmetic, algebra, and geometry. If more advanced courses in mathematics are offered they are as a rule elective. The number of students electing mathematics is small in most schools, as the only students interested in the higher courses are those who desire to secure advanced standing in college

or to teach the subject in a high school. No elective work is offered in 32 per cent of the schools reporting on this question.

Recitations by the students, supplemented by an occasional lecture, is the practically universal method of conducting classes. In nearly all cases a text is used as the basis of a course, the text being supplemented at the pleasure of the instructor.

One of the most important parts of the professional training of a student in a normal school is the practice teaching under supervision. In the schools reporting, 80 is the average number of class periods of practice teaching in mathematics which it is possible for a student to take who is making a specialty of this subject. In 76 per cent of the schools all students are required to do some practice teaching in mathematics, and the average number of class periods required is 54. This teaching is always under the direct supervision of a critic teacher. In 51 per cent of the schools reporting, the head of the department of mathematics is said to exercise some supervision over the practice teaching, but in some of these schools the supervision is very slight. Such supervision seems to the committee to be very desirable in order to unify the work in mathematics throughout the school, to make the work of the training school more efficient, and to keep the teachers of mathematics in the normal school in touch with elementary school work.

Correlation was also made a subject of inquiry. Of the schools reporting, 12 per cent say that no attempt is made to correlate the different mathematical subjects. Thirty-eight per cent are attempting to make some systematic correlation. The remainder attempt some correlation, but nothing systematic. Twelve per cent of the schools reporting on the question think it advisable to eliminate entirely the traditional boundaries between arithmetic, algebra, and geometry; 19 per cent think these boundaries should be eliminated to a large extent; 7 per cent not at all. Other schools suggest methods by which related topics in the different subjects may be correlated.

Sixty-nine per cent of the schools report some attempts at correlating mathematics with other subjects, usually with the sciences, but close correlation is made, probably, in but few schools. The replies to the questionnaire indicate that it is the general opinion that in arithmetic the larger part of the problems in the lower grades and some of the problems in the upper grades should be taken from the other subjects that the pupils are pursuing and from the pupil's environment.

Much more is now being done than ever before in the normal schools in the way of using algebra and geometry, as well as arithmetic, to solve problems taken from the other school subjects and from the experience of the pupils. Some of these problems are taken

from texts, which now furnish more problems of this kind than formerly, some are obtained from published lists and from periodicals, and many more are made by the teachers themselves. Some of the teachers in normal schools have been active in arousing interest in genuine applied problems. The great difficulty, as has been often expressed in the replies received by the committee, is to find applied problems that are of real interest to a large number of students.

The question was asked, What causes operate to produce failures in mathematics in normal schools that do not operate in other subjects? About one-fourth of the answers say none. Other answers say that too much time is devoted to other subjects; that we have poor methods of instruction and poor elementary training; that too much is attempted; that the subject, as it has been taught, lacks interest.

The libraries of the normal schools are generally well supplied with works on elementary mathematics, and on the history and teaching of the subject. The departments are also supplied with apparatus necessary for illustrative work in teaching weights and measures, and geometric models for use in teaching mensuration and solid geometry.

EXAMINATIONS.

Thirty-seven per cent of the schools reporting say that examinations are held at the option of the instructor. In such cases the examinations are given at intervals of from 2 to 6 weeks at the completion of important topics. The rule in the remaining schools is to hold examinations at the end of each term or semester. In one school no examinations are given. The examinations are written in 83 per cent of the schools; in the remainder, both written and oral. In 41 per cent of the schools the examination periods are from 40 to 50 minutes; in 46 per cent from 1 to 2 hours; in 13 per cent from 3 to 4 hours.

The principal objects of the examinations are to test the knowledge of the students, to furnish a test of the teaching, to give unity to the subject, and to secure a review. In 5 per cent of the schools the grading of pupils depends entirely upon the examinations, and in 2 per cent not at all. In 20 per cent the examinations count for one-half in determining grades; in 44 per cent for one-third; and in 29 per cent for less than one-third. In 44 per cent of the schools there is a tendency to give less consideration to written examinations given at stated intervals, and in 45 per cent there is a tendency toward abolishing them.

In three States the governing board of the normal schools or the State department of education conducts annual examinations, which in some cases determine promotion and graduation.

MODERN TENDENCIES IN THE TEACHING OF MATHEMATICS.

The committee asked for opinions concerning some recent movements to improve the teaching of elementary mathematics. While it is probable that not all of these recommendations are carried out in the schools from which they come, they are valuable, at least, as indicating present tendencies.

One question asked for recommendations for improving the initial instruction in arithmetic, algebra, and geometry; and a number of recommendations were received. About 18 per cent of the schools recommend that the study of arithmetic be begun later. There should be more objective work, especially in the lower grades, and the work should be less mechanical. There should be drill on the fundamental operations until the pupils have a much higher degree of speed and accuracy than at present.

In teaching algebra, the recommendation comes from almost all schools that this subject be more closely connected with arithmetic, so that the transition from arithmetic to algebra may be simpler and more natural. To accomplish this it is suggested that the literal notation be introduced not later than the seventh grade and used freely in the eighth grade. Furthermore, to make algebra more interesting and useful, let it be used in solving real problems.

In respect to geometry, the answers show a general tendency to make the subject less formal in the beginning. By the use of simple illustrations attempts are made to base the elementary concepts more completely upon the experiences of the pupils. Numerical and other applied problems are used to give the subject more meaning.

Fifty-one schools sent replies to the question "What traditional topics should be omitted from the course of study in arithmetic, algebra, and geometry?" In the case of arithmetic, the general recommendations are to omit all obsolete and purely technical topics and unduly complicated problems. The number of topics which one or more schools recommend for omission is large. Thirteen schools recommend the omission of cube root, except by factoring; 15, the omission of true discount; 9, highest common factor by the Euclidean method; 6, partnership and compound proportion; 5, partial payments and progressions; 4, compound and annual interest, much of percentage, and complicated problems in fractions; 3, bank discount and longitude and time. Other topics are listed for omission by one or more schools. Although a very small per cent of the schools would omit all of the topics just named, the list possesses some interest in that it shows how many of the traditional topics are being removed from the course. There are further suggestions that indicate a somewhat general tendency to abridge the above topics when they are not omitted.

It is generally recommended that the work in algebra be less formal; that we omit or postpone until late in the course complicated multiplications and divisions of polynomials, complicated problems in factoring, fractions, and radicals, and highest common factor by division. The notion of function and of variation should be introduced early. A large number of applied problems should be given throughout the course.

A number of schools recommend that limits, variables, and incommensurables be omitted from elementary geometry. Other schools think these topics should be retained, but that in discussing them only illustrations should be used, and that no proofs should be attempted. In some schools it is thought that with students of the grade of maturity of those in normal schools, it is profitable to discuss the formal proofs of some of the elementary theorems in the above topics. There is general agreement that the proofs of some of the more difficult theorems in plane geometry may be omitted.

Twenty-six per cent of the schools report that some laboratory work is done in mensuration; 15 per cent do field work in trigonometry or surveying; 33 per cent more make some application of the mathematics either in laboratory work or in applied problems. The results from laboratory work are generally thought to be good, but not in all cases.

About 14 per cent of all schools reporting to this committee have made some experiments in teaching mathematics. These were in the main experiments to determine better methods of teaching arithmetic. One of these, for example, was an experiment to determine the efficiency of daily drills in the fundamental operations and to determine the effects of such drills upon the reasoning power. It is encouraging to know that a number of teachers of mathematics in normal schools are undertaking to obtain in a scientific way data concerning improvements in teaching mathematics.

The schools were asked to state what dangers they see, if any, in recent movements to make secondary mathematics more intuitive, useful, and attractive. The answers show a wide range of opinion, as might be expected. Forty-four per cent of the answers say that no danger is seen. Others say that the movements in question have caused inefficient teaching; that drill is neglected; that the disciplinary value of the subject is lost; and that there results superficial and unrelated knowledge.

SUBCOMMITTEE 3. PRIVATE NORMAL SCHOOLS.

The great majority of the private normal schools conduct their own preparatory departments, and hence have no specific entrance requirements. They generally receive students of all grades and fit them for entrance to such courses as they offer. Applicants for advanced standing are usually allowed credit on high-school diplomas or on recommendation from former instructors, though students coming from high schools are very often found deficient in the most elementary parts of mathematics. It is recommended that in the lower schools persistent drills be given in the fundamental operations of arithmetic, so that students may perform these operations not only with facility, but with absolute certainty as to the correctness of their results and may be able to prove the accuracy of their answers.

There seems to be no uniformity whatever in the credits given by the higher institutions of learning for mathematics covered in private normal schools. Each one of these schools stands on its own merits and has its own reputation. The State universities usually give full credit for all the work done in mathematics in the private normal schools of their own State. The comparison of the widely differing reports would seem to indicate that about 30 per cent of the graduates of the private normal schools enter universities and technical schools for the purpose of doing more advanced work, while about 50 per cent of the graduates teach for five years or more, usually in the public schools.

Contrary to the usually accepted opinion, it is probably true that it is not the chief object of the private normal schools to prepare students for teaching. The majority of students later go into business, and a considerable number into technical work. Consequently the utilitarian side of the study of mathematics is probably the phase that is chiefly emphasized. Special courses for students bearing upon the history and teaching of mathematics are rarely, if ever, offered.

Classes are always sustained in arithmetic, the time required of the student depending on his proficiency upon entering the school. From 40 to 60 weeks are usually given to algebra, and very satisfactory courses are generally offered. These often include college algebra. Usually about 36 weeks are given to plane geometry. Many of the schools which offer four-year courses require about six months' work in analytic geometry and perhaps the same time in the study of the calculus, though, not infrequently, the course offered in the latter subject extends throughout an entire year. Very little of the instruction is given in the form of lectures to the class, recitations on the part of the pupils being the well-nigh universal rule.

The recitation periods are very generally one hour in length, five recitations per week. The school year contains from 48 to 50 weeks, without intermission. There appears to be a growing tendency to give frequent tests or examinations. These are usually written and required at various intervals. Some schools give tests as often as once a fortnight, others once a month, and still others not oftener than once in 6 or 10 weeks. Final grades do not usually depend wholly upon result of these tests. Perhaps a weight of about 50 per cent is given to them and about 50 per cent to the record made in class.

SUBCOMMITTEE 4. TEACHERS FOR NORMAL SCHOOLS.

There are about twice as many men as women teaching mathematics in the normal schools of the United States. In the eastern part of the country, however, the women far outnumber the men.

The training of the teachers varies widely. About 60 per cent of the teachers have had high-school training, 55 per cent have had normal-school training, 80 per cent have had college training, and 36 per cent have done graduate work at the universities. The average training for the men is considerably higher than that of the women. There is a marked tendency toward a requirement of graduate work as a prerequisite for teaching mathematics in normal schools. There is also a wide variation in the degrees held by the teachers; about one-third of them have no degree, 42 per cent have the bachelor's degree, 18 per cent the master's degree, and 6 per cent the doctor's degree. The men who hold the higher degrees far outnumber the women.

The term of service in the present teaching position averages about seven and one-half years and is practically the same for men as for women. Twenty-three per cent of all the teachers have served in their present positions for 10 or more years, and 50 per cent have served 5 years or more.

The teachers in the normal schools have not contributed many books or articles to the literature of their field. This may be due, in part, to the fact that most of the teachers meet a large number of classes each week and consequently have neither the time nor the energy necessary for authorship. There is a tendency to lighten the work of the teacher in the normal schools, and this may result in a more productive scholarship from this source. Practically all of the contributions made up to the present time have been by the men.

None of the schools make a practice of employing their undergraduates as instructors, and only a few of the schools so employ their graduates without further training.

Most of the teachers of mathematics would prescribe work through the calculus as the minimum academic preparation for teachers of mathematics in normal schools. About 15 per cent of the teachers would include more advanced courses as the minimum preparation.

A large per cent of the teachers express the opinion that in addition to the academic training the prospective teacher of mathematics should also be required to take a professional course, including psychology, history of education, school management, and special methods in the courses that he is to teach.

About 30 per cent of the teachers express the belief that an experience of from one to five years in elementary and secondary schools should be a prerequisite for normal-school teaching.

Most of the normal schools of the United States were established primarily to prepare teachers for the work of the elementary schools, and the various subjects of the curriculum were determined largely by this ideal. Graduate work was not a prerequisite for the normal-school teacher, for his margin of knowledge was usually sufficient if he had completed the undergraduate work at a reputable college. In recent years, however, the normal schools are sending an increasingly large number of their graduates into positions in the secondary schools. Some schools in the Central West send almost half of their graduates into such positions.

This extension of the functions of the normal school has necessitated an extension of the curriculum into the more advanced subjects. A few years ago no mathematics was offered in the normal schools beyond solid geometry and trigonometry. To-day analytics and calculus are offered in several of the best schools, and there is a marked tendency to offer these advanced subjects in most of the schools. These subjects are now offered in order that the prospective teacher of mathematics may have a broader view of the subject and a proper perspective for teaching mathematics in the secondary schools.

The extension of the curriculum into the more advanced subjects means that the teachers of mathematics in the normal schools must be selected from those who have done graduate work in mathematics. Forty-five per cent of the men and 18 per cent of the women now teaching mathematics in the normal schools have completed at least one year of graduate work in the subject, and there is a marked tendency in this country to require at least a year of graduate work from all prospective teachers. A year of graduate work will be required, not because of the degree that may thereby be secured, but because of the amount of work that it represents, and because of the better basis that it gives for a rational presentation of the subject to those who are to become teachers.

MATHEMATICS IN THE ELEMENTARY SCHOOLS OF THE UNITED STATES

INTERNATIONAL COMMISSION ON THE TEACHING
OF MATHEMATICS

THE AMERICAN REPORT
COMMITTEES I AND II



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MATHEMATICS IN THE ELEMENTARY SCHOOLS OF THE UNITED STATES.

SUBCOMMITTEE 1. SCHEMATIC SURVEY OF AMERICAN EDUCATIONAL INSTITUTIONS—THEIR SEQUENCE AND INTERRELATIONS.

The following report of Subcommittee I was prepared to meet the special needs of foreign readers. Although it does not relate solely to elementary schools, it forms an appropriate introduction to the general report of Committee No. I, since some schematic survey of our educational institutions is necessary in beginning the study of our system. For this reason it precedes the general report of this committee.

GENERAL DIVISIONS.

The American system of education divides into two main divisions:

A. Public education : Government controlled and Government supported.

B. Nonpublic education : Controlled by religious bodies, private corporations, or persons with philanthropic or fiduciary intent. May be subdivided into: (*a*) Religious education, controlled and supported by religious denominations and sects; (*b*) private and semiprivate institutions, including those managed for profit; and (*c*) supplementary and extra institutionalized agencies, such as the Carnegie foundation for the promotion of teaching, the Russell Sage foundation, and the National Education Association.

AGENCIES OF PUBLIC EDUCATION.

I. The National Government. This administers but a small portion of public education. (*a*) The Bureau of Education is a national office, under the Department of the Interior. It is designed mainly to assemble, digest, and disseminate educational information. It is also charged with certain responsibilities for native education (in Alaska). (*b*) The Indians of the United States are mostly wards of the Nation. As such they are educated by the National Government, either through subsidies granted to church bodies or through schools maintained by the Department of the Interior. These schools partake of an industrial character. (*c*) The National Government also organizes or provides for the organization of the school systems for its dependencies, such as Porto Rico and the Philippines. Similarly it provides for the school system of the Capital City—Washington. (*d*) Two principal schools—West Point and Annapolis—and a number of minor schools are maintained for the

training of officers and men for the Army and Navy. (c) The National Government makes appropriations to each of the States for the furtherance of higher education in agriculture and the mechanic arts. It has also in the past provided extensive land grants for the support of the public-school systems of the States and universities. In conjunction with the States, or sometimes philanthropic agencies, it carries on investigation and experimental work in agriculture for educational purposes.

II. The State governments. The primary agency for the exercise of educational functions is the State. The National Government exercises no control and so far little power of suggestion over State governments.

- (a) State constitutions. These, as fundamental laws, usually contain provisions requiring the organization of systems of public education, and often defining special features.
- (b) State legislatures. These, meeting usually annually or biennially, pass laws fixing, often in great detail, forms of educational administration, providing for support and the like.
- (c) State board and State superintendent. Nearly all States have provisions for a State machinery of educational administration, the scope and authority of which vary greatly. In general, this administration is confined to elementary and secondary education. In many cases the State superintendent is elected by general suffrage, and his functions are mainly supervisory and advisory. In other cases he is an educational expert, appointed by a State board, and with considerable authority for imposing standards and administering types of education. State boards also vary widely in functions. Some have authority to select a variety of educational experts, to direct the expenditure of funds, and to control certain types of education. Others have functions limited to custody of State school funds and the certification of teachers.
- (d) State educational institutions. The State forms the area for the administration of a variety of educational institutions. 1. Universities and colleges. Most Western and Southern States support and control universities; and all have an agricultural college, partly supported by national grants. Frequently these are directed by special boards appointed by the State executive. 2. Normal schools are found in all but two States, governed either by a State board or by local boards appointed for this purpose by the executive or by a combination of both authorities. 3. Schools for delinquents, defectives, and dependents. Almost everywhere most of these are State institutions; but sometimes the State supports and leaves control to a religious or philanthropic body. 4. Special schools, especially for agricultural, forestry, or technical training, maintained as State institutions, are found in a few States. 5. In some States a library commission is maintained as part of the State educational machinery.
- (e) Teachers' institutes. State libraries for teachers and extension work are in some cases organized and supported by State authorities, but more commonly by smaller areas than the State.
- (f) In a few States, State authorities certificate teachers, inspect schools (especially secondary schools), select textbooks, approve plans for buildings, examine pupils (especially for admission to secondary school or college), and provide or suggest courses of study. Such functions are found in relatively few States, but there is a growing tendency in this direction.

III. Local areas of administration of education. These vary in size and political importance in the various States. Five types are commonly found:

- (a) The county, the largest subdivision of the State, under the law exercises little or no educational function in New England, much in most Southern States, and a varying amount in North Central and Western States. Is of considerable importance as an authority for inspection (commonly miscalled supervision), auditing of educational accounts, certification, after training of teachers, and of taxation. Less frequently it is the administrative unit for secondary agricultural education; occasionally for general secondary education.
- (b) The town or township. Usually embraces several schools and is frequently the area of local administration and taxation in all that pertains directly to secondary and elementary schools.
- (c) The district. Originally the area from which one school drew its pupils. In early stages of the evolution of educational administration it had important functions, apart from the direct management of schools. These functions are gradually being transferred to larger areas. They are the consolidation of districts, and the transportation of pupils. In many States large central schools are being formed.
- (d) The city. Municipal areas give rise to districts with special characteristics. The city frequently combines the administrative functions exercised by county, town, and district, and in some cases the State even relaxes its supervision in the case of city districts. Within the cities of the United States educational administration tends to become centralized, lay boards becoming smaller, the authority of educational experts greater.
- (e) In a few States special administrative ways exist. In Massachusetts a union of towns forms a supervisory district; in New York the school commissioner district differs from the county; in Virginia the State is divided into a few large areas for certain kinds of supervision.

TYPES OF PUBLIC SCHOOLS.

I. The kindergarten, usually admitting pupils from 3 to 5 years of age, and seldom holding them beyond 6. Found mainly in cities, and most commonly provided in poorer sections. In 1907-8 all cities having 8,000 or more population reported their kindergartens as containing—157,900 pupils. Nowhere is kindergarten training prerequisite to entrance to the elementary school.

II. The elementary school. This term is now commonly applied to the types of schools formerly designated as primary, intermediate, and grammar or grammar grades. The course is nearly always 8 years in length, very rarely 7, occasionally 9 or 10. The completion of the elementary course is necessary for entrance to the high schools, and the elementary school rarely provides work paralleling that of the secondary school, this providing the marked contrast to European practice. In a few cases it is attempted to teach secondary subjects, such as foreign language and mathematics, in the upper grades of the elementary school. Under present conditions the standard maintained by the elementary school is such that seldom more than half of all children are able to finish it by the close of the compulsory school period—14 years of age. In 1907-8 some 16,100,000 children were reported in the elementary schools.

III. Secondary schools under public support are commonly called high schools. Of these there are four or more distinguishable types: (a) General high schools, sometimes subdivided as classical, literary, scientific, etc., whose aim is primarily cultural, and whose curricula are mainly composed of languages, mathematics, science, and history. (b) Commercial high schools, sometimes within general high schools. These vary largely in character, some having short courses, other substantial four-year programs, whose controlling aim is preparation for commercial vocations. (c) Technical high schools, variously called manual training, mechanic arts, and polytechnic high schools, which aim to include with parts of a general course a considerable training in the technical subjects which attach to the industrial arts or household arts. (d) Agricultural high schools. These vary largely in curricula, some being ordinary high schools with attempts at agricultural training, others centering mainly around studies of agriculture.

In 1907-8 there were in the public high schools of the United States 790,000 students, or about 0.92 per cent of the total population; of these nearly 60 per cent were girls. Very few of these students were under 14 years of age, and also few were over 19. As contrasted with European secondary schools, the most significant fact is the late age at which pupils may take up secondary school work, it being obligatory to complete the elementary course first. About one-half the pupils entering high school do not stay more than two years, or beyond the age of 16. Of the above number of students, 59,000 were reported in commercial departments. No separate statistics are available of attendance in public technical secondary schools, but in 1907-8 there were in the public and private schools of this type 58,000 students.

IV. Normal schools, designed primarily for the training of teachers for elementary schools, are found in all but four States, where courses at State colleges are provided. In 1907-8 there were 189 of these State normal schools, with 64,000 students. Two types are distinguishable: Those receiving only high-school graduates, and usually having a course two years in length, and those receiving pupils with little more than elementary school preparation, and having courses from three to five (usually four) years in length. Sometimes both kinds of courses are found in the same school. The States better supplied with secondary schools now usually require high-school graduation for admission.

Many of the larger cities of the United States also maintain city training schools which receive high-school graduates and give them a one or two years' course in preparation for work in the elementary schools of the respective cities.

A number of normal schools, in addition to their two-year courses for high-school graduates, also maintain four-year courses for exceptional students, and give degrees. At least one (Albany Normal College, New York) aims primarily to prepare teachers for secondary schools. But a large and increasing majority of the teachers in secondary schools must be graduates of the regular colleges and universities.

Normal schools are frequently resorted to by young people whose primary aim is a liberal education, rather than a preparation for teaching.

V. Colleges and universities. Satisfactory statistics of public as distinguished from private colleges and universities do not exist. In 1907-8, of the 573 universities, colleges, and technological schools having 150,000 students, it was reported that 89 having over 60,000 students were public—that is, were supported mainly at public expense and were governed by public bodies; 62 of these were State universities or colleges of agriculture. The attendance at these institutions averages much higher than at private schools. Usually

their admission requirements coincide with the requirements for graduation from local secondary schools, thus forming part in a continuous chain of public education.

Affiliated with, or integrated with, many of the public universities are professional colleges for medicine, law, pharmacy, and the like. Within recent years there are also appearing special colleges as parts of the universities for the training of teachers, especially those for secondary schools, and those preparing for administrative work.

VI. Special schools. These exist to meet special class or social needs, and have their standards governed by the conditions to which they must adapt themselves.

- (a) Under the National Government are two schools primarily to train officers for the Army and Navy. These are of collegiate or technological rank, and receive students of selected qualities. In addition, the Government maintains extension or graduate study for officers in service and a number of schools for the training of cadets or newly enlisted men for the Navy.
- (b) Indian education is also under the direction of the National Government. Schools are maintained in Alaska, on the reservations in the United States, and in a number of cases off the reservations, for pupils especially of a more advanced type. The work in these schools is usually elementary in character, with increasing attention to practical or vocational aspects. In a few schools (Hampton, Haskell) special attention is given to the training of teachers, and especially for the transmission of the household arts and suitable vocations for men.
- (c) Originally, in most of the States, philanthropy supported the education of some defectives, dependents, and delinquents. Then the States subsidized these institutions and later in many cases either took them over or supplanted them with public schools of day or institutional type. Some are under the State administrative machinery, others under local control and support, but these distinctions are unimportant. Each type of school works out courses of instruction and methods adapted to its needs. The work is increasingly vocational in character. In 1907-8 there were 40 State schools for the blind, with 4,340 pupils; 122 schools for the deaf (55 State, 51 public day schools, and 16 private), with 10,042 students in the State schools; and 25 State institutions of school character for the feeble-minded, with 17,225 inmates. In the same year 92 reform schools reported 36,900 pupils, nearly all from 12 to 16 years of age. The care of dependents is mostly under private auspices, and no satisfactory statistics are extant of the number of schools.
- (d) Several States have established special forms of industrial schools, sometimes of secondary grade, sometimes intermediate between secondary school and college. There are no available statistics of these. As a rule their curricula approximate in character the technical secondary schools, with specially intensive developments along the lines of agriculture, industrial arts, and household arts.
- (e) Continuation schools, evening schools. These are extensively developed in the larger cities of the United States. In 1905-6, 23 cities reported 314,000 children enrolled and 129,000 in average daily attendance. No satisfactory classification exists showing number who are taking technical work, high-school work, studies of an elementary nature, or special work in English for foreigners. All these

types are represented. It is generally known that special classes for the teaching of English to foreigners are largely on the increase and that technical classes are being steadily developed. But it is rare to find consistent programs running through a series of years—the work is fragmentary.

A form of educational work growing out of the universities is that called university extension. By means of lectures and extension classes it seeks to disseminate and popularize higher education.

NONPUBLIC AGENCIES OF EDUCATION.

I. Religious organizations. A very large part of private education in the United States from the lowest to the highest grade is carried on by religious organizations. With very few exceptions (in the case of schools for dependents, delinquents, and defectives) these schools receive no public aid; and those not receiving public aid are only rarely under public supervision, and that of the most perfunctory character. No system of certification prevails with regard to teachers in these schools; and they develop their own standards according to their own needs. Except for colleges and some forms of secondary education, it is not possible to procure statistics. In general it is true that the competition of the public schools tends to cause these private institutions to endeavor not to fall too far behind in the quality of their teaching. In these schools, especially those under the Roman Catholic Church, many of the teachers give their services as part of their religious duty, and where teachers work for pay, that is very low. As a rule, these schools are not experimental, but aim deliberately to parallel and if possible to fill the place of the public schools for certain classes of children.

II. Philanthropic organizations. These not infrequently grow out of church influences, but also quite commonly have no direct religious connection. On the whole they tend to develop types of education with which the system of public schools does not at present concern itself. These led the way in establishing higher education, in endeavoring to educate the defective, the delinquent, and the neglected; in establishing vocational education; and in developing the wider adaptations of education in vacation school, playground vocation bureaus, and so on. Consequently the schools under direction of non-religious philanthropic agencies tend to be experimental, and their standards change, and the results of their work do not lend themselves to statistical treatment.

III. Commercial ventures. Some forms of education in the United States represent efforts for private profit. The types of school resulting vary largely in character and quality. Private secondary education usually caters to the wealthier classes of the community, especially in providing schools that combine residence and instruction. These schools have not State supervision, but tend, by virtue of their clientage, to be of excellent quality. Many of them have as their controlling function the fitting of students for college. Another type is that fitting for certain portions of commercial practice. These vary enormously, some being of excellent quality, others giving short courses and relying largely on advertising to win students. Of similar quality are a number of private normal schools, which aim to prepare students for teachers' examinations. Correspondence schools are private ventures, sometimes giving good work under adverse conditions, sometimes preying upon the credulity of young workmen. A few private schools for industrial arts (trade schools) exist, but play a small part in vocational education.

The large majority of colleges and universities are private, and frequently originated under the auspices of some religious organization; but these are tending away from any form of religious control, and fall into the group described above as philanthropic, since only a small part of their actual expenses are usually derived from the fees of students.

Over private educational agencies of all sorts there is almost no State control, except in the case of those that deal with delinquent or afflicted children. True to the prevalent individualism of America, it is assumed by the State that the demands of those who patronize the private schools and the competition of those under public management is sufficient to insure the quality of the work of the former. In New York and Connecticut there are certain beginnings of State supervision, but they are not yet significant, except in the particular respect that scholarship standards in secondary education are made largely the same in New York State for both public and private schools by a system of examinations conducted by public authorities. But in such matters as certification of teachers, standards of attendance, equipment, and methods of teaching there exists no form of public control.

The exceptions are found in those institutions which care for destitute, defective, and delinquent children, and here State supervision is exercised primarily because these institutions receive considerable public aid. Those philanthropic institutions that do not obtain public assistance have little or no public inspection.

TYPES OF NONPUBLIC SCHOOLS.

These usually parallel the types of public school given above, except as regards special features, like the boarding life of the private secondary school, the short courses of the business school, and the religious education found in the schools under religious organizations.

I. Kindergartens. Almost always philanthropic and frequently contributing some training of teachers.

II. Parochial elementary schools. These are mainly developed under the Lutheran and Roman Catholic Churches, and usually parallel the public schools. In the Catholic schools the supervision is under the parish priest, and the teachers are often members of orders.

III. Private elementary schools maintained for profit are few and have small influence.

IV. Private business schools are conducted chiefly for profit. Over 150,000 students attended such schools in 1906-7. Admission requirements and quality of work vary enormously and generally tend to be strictly practical, i. e., produce in a short time the maximum of vocational efficiency.

V. Private trade schools. These are not numerous and vary greatly in character. A few are maintained by industries to assist apprentices, in which case the work is usually technical, to supplement shop work. In other cases schools maintained for profit give short and intensive training in certain trades (commonly woodworking, plumbing, machine-shop work, and so on). Several schools endowed by philanthropy give long courses of trade training.

VI. Correspondence schools. These probably have over a hundred thousand students in the United States (no exact figures available) to whom they teach mathematics, drawing, applied science, especially mechanics, and in less degree a few other subjects. Standards are variable; much of the work plays upon credulity, but under favorable conditions the more self-reliant students gain much. They exist mainly for profit.

VII. Parochial secondary education. This is yet little developed. Secondary education for religious bodies is accomplished mainly in academies and preparatory departments of denominational colleges.

VIII. Private secondary schools. These are numerous and strong. They fill two chief functions, sometimes not closely related. They serve as boarding schools at the adolescent period when many parents believe that boarding-school life is very valuable for their children; and they serve to prepare pupils directly for college. They grow but slowly, but have a fairly constant attendance of over 150,000 pupils. Many of them have endowed foundations.

IX. Colleges and universities. These seldom exist for profit, usually owing their foundation to religious or philanthropic zeal. In recent years religious control has greatly relaxed, so that it was easily possible for many of them to change some nominal restrictions in their organization and come under the definitions imposed by the Carnegie Foundation for the Advancement of Teaching.

In 1907-8 there were reported to the Commissioner of Education 484 private universities, colleges, and schools of technology, with enrollment of over 96,000 students. While a secondary education is assumed as prerequisite for admission, it is known that standards vary widely among these private institutions of higher learning.

Professional schools, often parts of universities but also in many cases independent, are, apart from those devoted to engineering pursuits, of six kinds—theological (9,500 students), law (18,000 students), medical (22,000 students), dental (6,500 students), pharmaceutical (5,500 students), and veterinary (2,200 students).

X. Special schools. A variety of special schools not included above exist under private leadership. The education of negroes, of immigrants, and of defectives has produced schools adapted to meet particular ends. Frequently these serve society as experimental stations, pointing the way to subsequent State action. Their character and purposes are too varied to admit of statistical treatment.

COMMITTEE NO. I. GENERAL ELEMENTARY SCHOOLS.

The special field of investigation assigned to this committee was the teaching of mathematics in both public and private schools of the rank known as elementary schools. It was desired that while the investigation should cover whatever ground seemed pertinent, it should especially consider the following topics:

(*a*) The aim and organization of the schools and the general relation of each type of school to the others; (*b*) the mathematical curriculum in other schools; (*c*) the question of examinations from the point of view of the schools; (*d*) the methods employed in teaching in the schools; (*e*) the preparation of teachers for the schools. It was desired that the report should particularly set forth the present conditions and tendencies. An attempt has been made to carry out the spirit of these directions. The report is organized with reference to these five points.

I. THE AIM AND ORGANIZATION OF THE ELEMENTARY SCHOOLS.

DEFINITION AND AIM OF ELEMENTARY EDUCATION.

Elementary education is that training which by common custom is deemed desirable and necessary for the duties and privileges of citizenship. It is usually made compulsory by law. Like all such definitions, the meaning of this statement becomes clear only through an examination of its interpretation as given in the curricula of the various school systems or in somewhat more specific statements of its content by various individuals. The elementary school strives to give the pupil control over the tools for the acquisition of knowledge, to develop interests and desires for further acquisition of knowledge, to excite a large number of curiosities, to stimulate thinking, to form the habit of collecting facts with which to think, and to aid the pupil in the formation of right habits of conduct. Prof. Thorndike has said:

The special proximate aims of the first six years of school life are commonly taken to be to give physical training and protection against disease; knowledge of the simple facts of nature and human life; the ability to gain knowledge and pleasure through reading, and to express ideas and feelings through spoken and written language, music, and other arts; interest in the concrete life of the world; habits of intelligent curiosity; purpose in thinking, modesty, obedience, honesty, helpfulness, affection, courage, and justice, and the ideals proper to child life.

Prof. Hanus has said:

Elementary, or presecondary school education, should provide the most salutary physical environment for the pupil, and promote his normal physical development through appropriate training. It should open the mind of the child and let the world in. It should stimulate and gratify curiosity in every field of worthy human activity, and utilize this curiosity for the acquisition of knowledge and the development of incipient permanent interests in and power over this knowledge. It should acquaint the pupil with his duties and his privileges as a temporarily dependent member of society, and promote the development of habits of thought and conduct in harmony with his growing insight.

ELEMENTARY SCHOOLS.

Different localities have interpreted this definition as seems proper to them, and in accord with the interpretation they have organized their elementary schools. In the Eastern States these schools often include the first nine school years or grades; in the South, usually seven years; in the North and West usually eight years. There is a movement urged by some of the best educators to have the elementary grades cover the first six school years, from the age of 6 to the age of 12, letting the secondary school cover the next six school years.

The school year consists of approximately 180 school days per year. In 1890 the average in cities of from 4,000 to 8,000 population was 180.9 days, and for the whole country 151 days. The school day is approximately five hours in length, and the school is in session from Monday to Friday, inclusive.

II. THE CURRICULUM IN MATHEMATICS IN THE ELEMENTARY SCHOOLS.

CURRICULUM IN GENERAL.

The term "arithmetic" is used to denote the mathematical element of the curriculum in American elementary schools. Arithmetic is taught in all of the schools. It may safely be said that the public at large consider it one of the most important subjects of the curriculum, and circumstances have given it in the past an unusually prominent place in the estimation of teachers. Mathematics was formerly, and is to-day, an excellent test of the general alertness and "brightness" of the pupils. As a result the "bright" pupils, who later become the teachers, continued to give emphasis to the subject. Furthermore, the organization of the rural school with its one teacher in charge of many classes necessitated much seat work, and since assignments in mathematics could readily be made and could be corrected very easily, while to have "ciphered through the book" was a mark of distinction, and since pupils who had any ambition to attain this distinction could thus be kept "in order" for long periods, mathematics came to form a major part of the curriculum in the rural school, and it has maintained its position to an extent up to the

present. There is a disposition in school circles to deny that the importance of mathematical training is such as to warrant the place it has occupied and still holds.

A study of the time devoted to various subjects in the grades in 50 of the leading cities showed that about 15.26 per cent of all of the school time was devoted to arithmetic. The same study indicated certain other facts bearing upon the place of mathematics in the curriculum. It showed that arithmetic as a formal study is being dropped out of the first and second grades and that in the upper grades arithmetic is being supplemented by algebra and geometry. Out of these 50 large school systems 19 only have algebra as such in the seventh or eighth grades and only 3 give any time or attention to geometry other than the work in mensuration. Recommendations have appeared from time to time during the past 15 years that the arithmetic course be curtailed and enriched—curtailed by omitting the study in the early grades and by omitting certain topics; enriched by introducing geometry, algebra, and other interesting topics in the upper grades. The statistics quoted above indicate that only 38 per cent of the 50 largest cities have followed out the recommendation. This same condition was found by another entirely independent investigation, except that even a smaller proportion of the schools were giving attention to algebra. So, in general, mathematics in American schools means particularly arithmetic with a certain amount of mensuration.

CONDUCT OF THE MATHEMATICS COURSE.

The teachers follow rather closely the textbook which has been provided for the schools. Whether following the text or independent of it, they are guided as to the extent of each year's work by an outline or course of study. The course of study is usually made out by the superintendent of schools of the city; in larger cities the superintendent delegates this work either to assistants or to a committee of principals or of principals and teachers, while occasionally the head of the department of mathematics in the high school is called upon to assist. The supervising officers of the schools are as a rule expert, experienced men and women, who have "risen to the top" because of their ability, and they bring to their work on the courses of study the product of their years of experience. While this is true, it is natural to inquire whether it is common to have in large systems an expert supervisor of mathematics, analogous to the supervisors of music and art. An investigation has shown that it is exceedingly rare for cities to employ such a supervisor of mathematics, although in some cases the work is delegated to an assistant superintendent. The same condition obtains in the case of geography, history, and other subjects. At the same time mathematics undoubtedly is a sub-

ject which calls for expert knowledge which is less commonly part of the equipment of all teachers; and, furthermore, it is a subject in the teaching of which there is to-day an unusual amount of change and uncertainty. It must be said that there are in all systems of schools a growing number of teachers who have made a special study of the teaching of mathematics in schools of education. The committee feels that expert supervision of arithmetic in the public schools should be more common.

COURSE OF STUDY.

The course of study in its simplest form consists merely of directions as to the page limits within the text, thus marking the assignment for each year. It varies from this to a much more detailed outline in communities where there is dissatisfaction with the general type of text. In these latter places there is given an outline by grades of the topics to be covered, together with teaching helps, references, and suggestions for problem material. In such cases it is generally understood that the outline rather than the text is to be followed. The wisdom of this plan depends upon the amount and character of the supervision, and upon the ability of the teaching force.

CONTENT OF THE CURRICULUM IN MATHEMATICS.

The following summary indicates the general content of the courses by grades:

Grade 1.—More or less incidental number work or number work correlated with manual training or with some other definite subject. Variations: From no number work at all to very formal work on addition, subtraction, and the multiplication tables.

Grade 2.—Number work correlated with other subjects. Addition facts emphasized and in many places the multiplication table begun. Variations: In a few schools there is no number work; in some, at the other extreme, division is taught.

Grade 3.—The processes of addition and subtraction mastered together with some work on the multiplication tables, the tables often being completed. Variations: A few schools give no work at all, while some give considerable work in fractions.

Grade 4.—Multiplication and division mastered. Variations: Fractions are taken up in many schools.

Grade 5.—Fractions mastered, some decimals introduced, denominate numbers employed.

Grade 6.—Decimals as related to common fractions, with much problem work. In some schools simple interest and percentage are begun.

Grade 7.—Percentage and some of its applications.

Grade 8.—Business applications of percentage. Mensuration of solids. Variations: No arithmetic at all in the whole or the latter

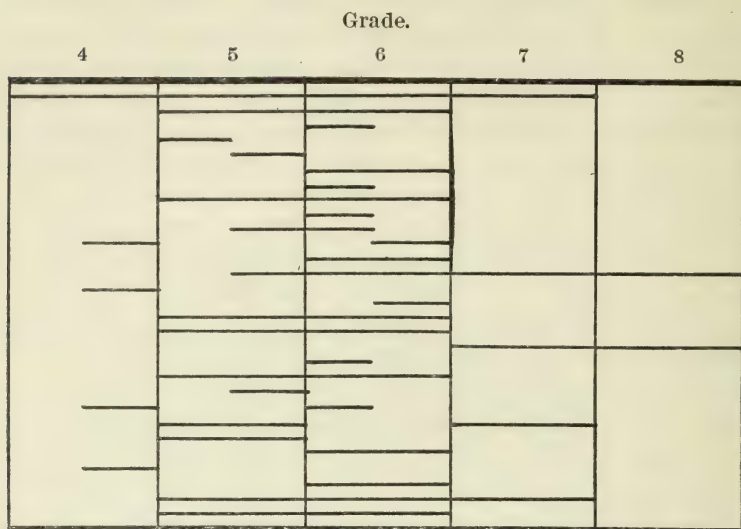


FIG. 2.—Grades in which decimals are given; taught in all schools; most commonly emphasized in grade 6.

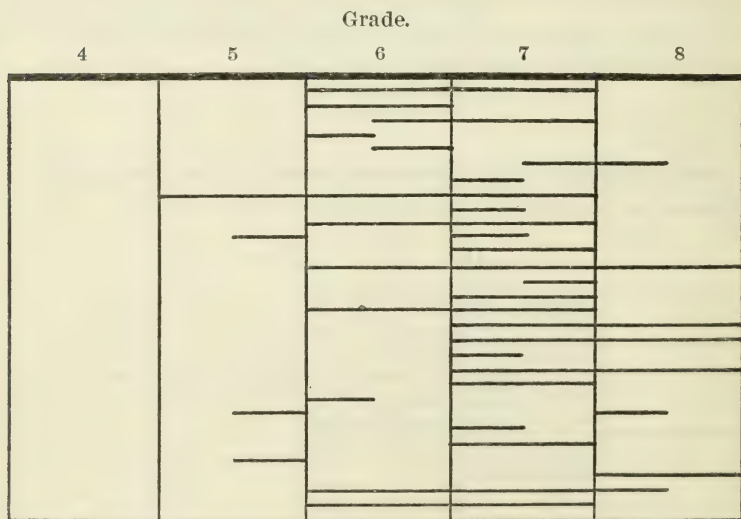


FIG. 3.—Grades in which percentage is given; taught in all schools; most commonly emphasized in grade 7.

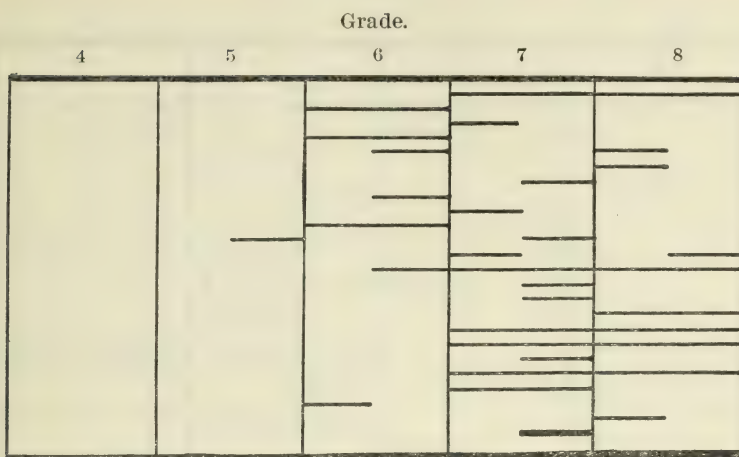


FIG. 4.—Grades in which simple interest is given; taught in all schools; most commonly emphasized in grade 7.

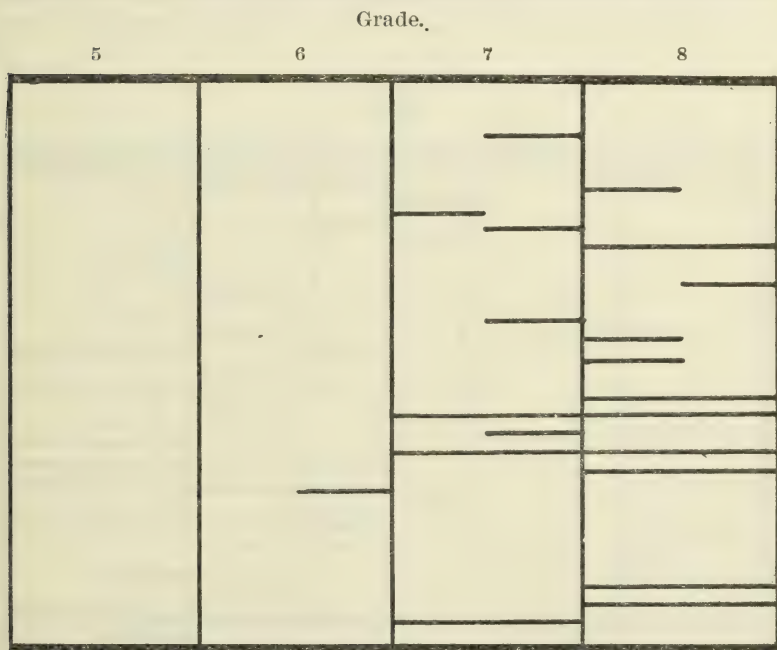


FIG. 5.—Compound interest; taught in eighteen out of twenty-eight schools, or 64.2 per cent of them; most commonly emphasized in grade 8.

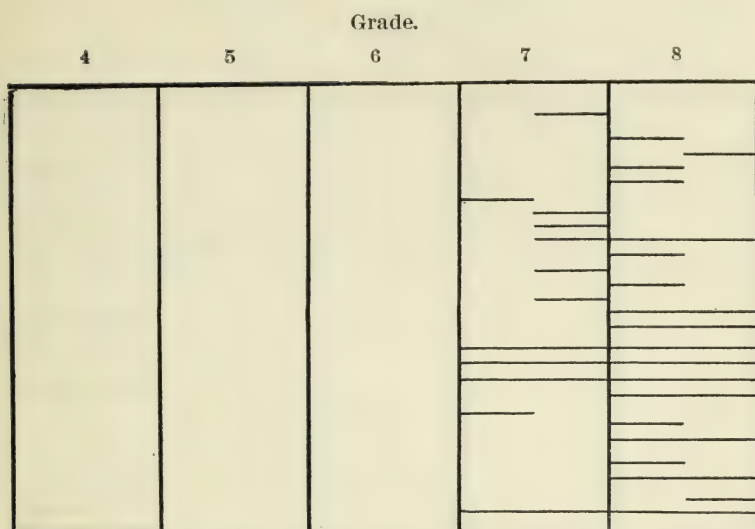


FIG. 8.—Bank discount; taught in most schools; most commonly emphasized in grade 8.

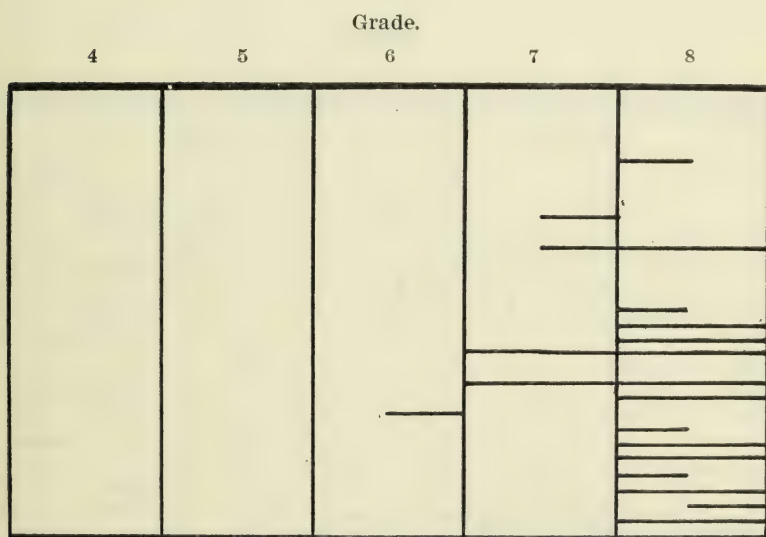


FIG. 9.—Partial payments; taught in 60.7 per cent of the twenty-eight schools; most commonly emphasized in grade 8.

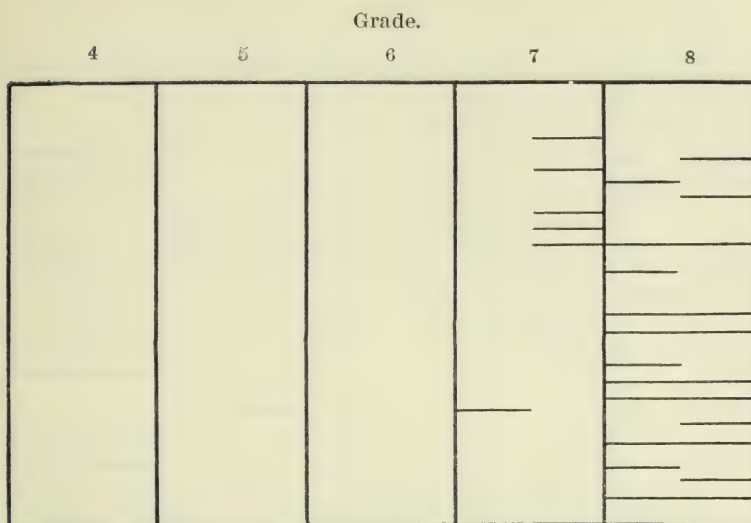


FIG. 12.—Stocks and bonds; taught in 71.4 per cent of the twenty-eight schools; most commonly emphasized in grade 8.

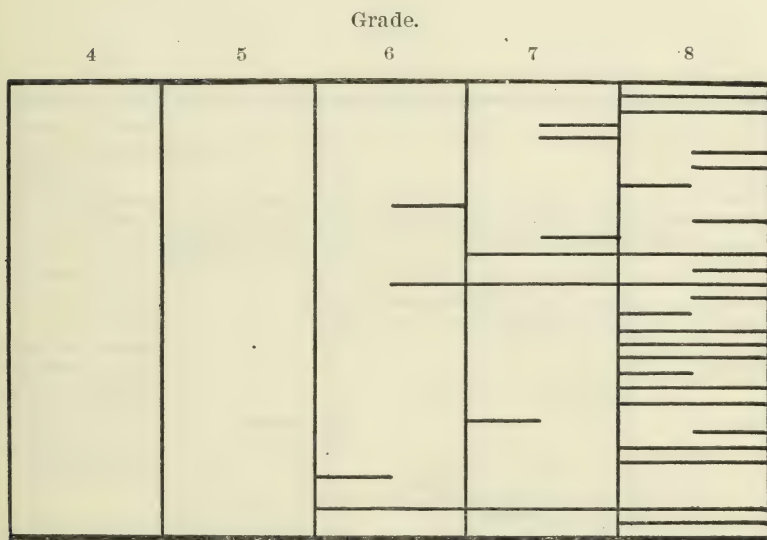


FIG. 13.—Simple proportion; taught in most schools; most commonly emphasized in grade 8.

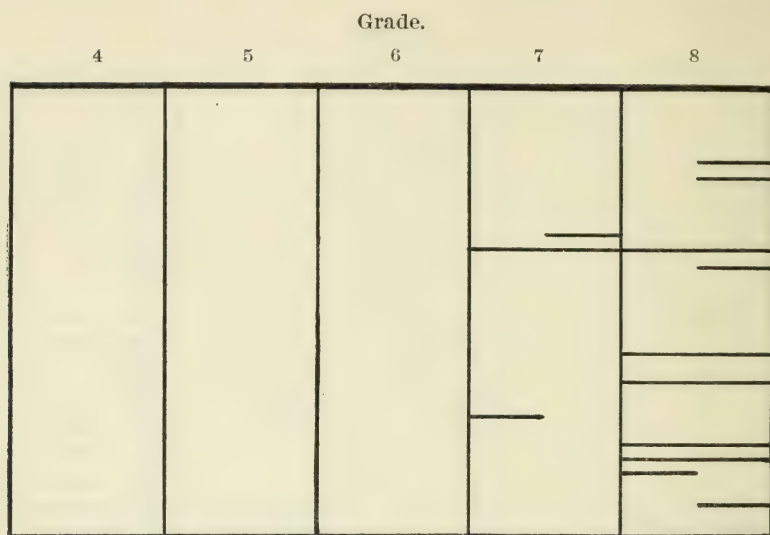


FIG. 14.—Compound proportion; taught in 42.8 per cent of the twenty-eight schools; most commonly emphasized in grade 8.

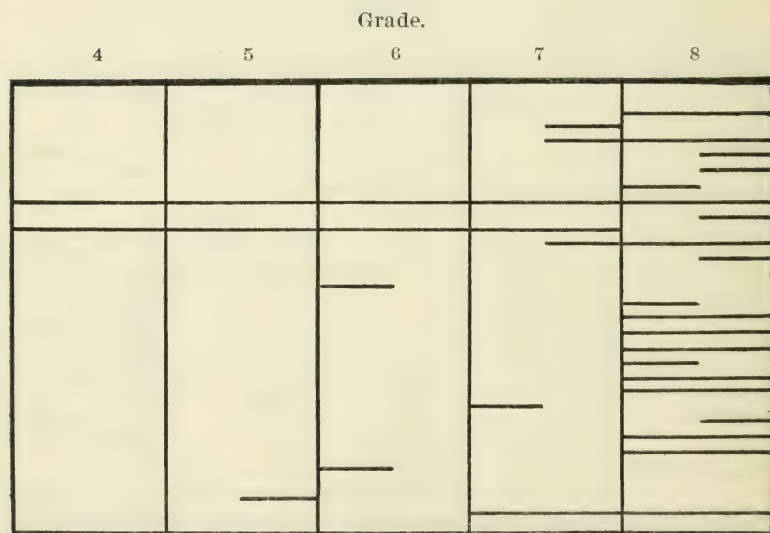


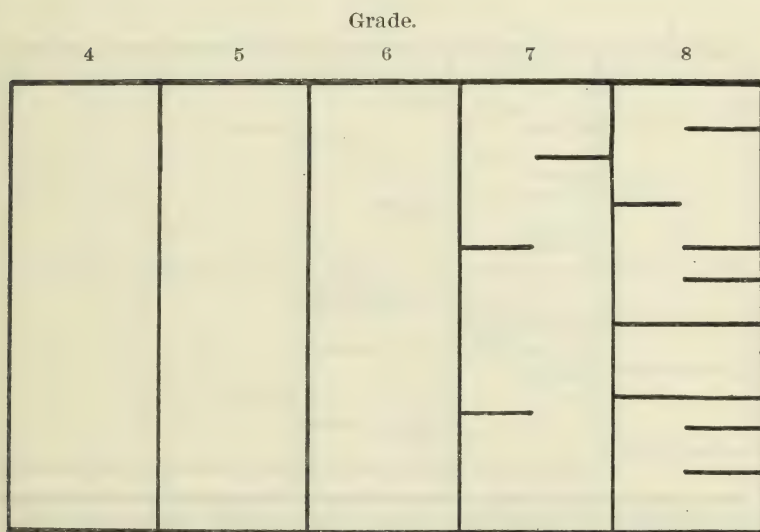
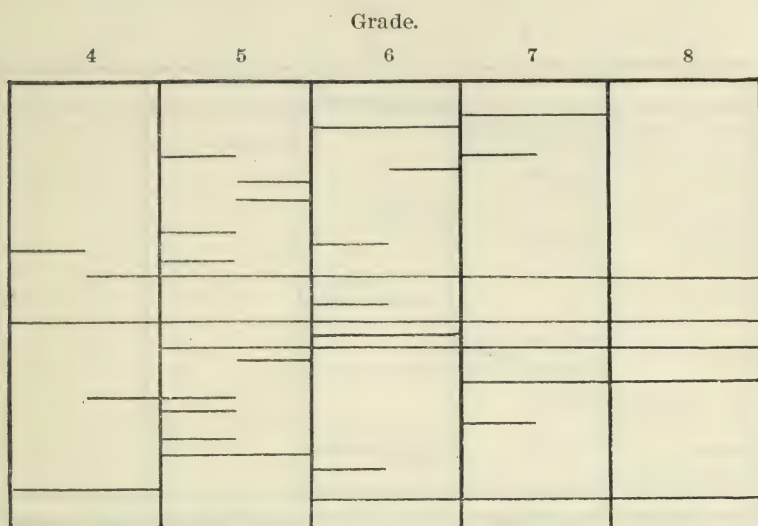
FIG. 15.—Ratio; the idea of ratio taught in most schools; usually emphasized in grade 8.

[illegible]

FIG. 16.—Mensuration of plane figures; taught in all schools; being spread out over the grades.

[illegible]

FIG. 17.—Mensuration of solids; taught in most schools; most commonly emphasized in grade 8.



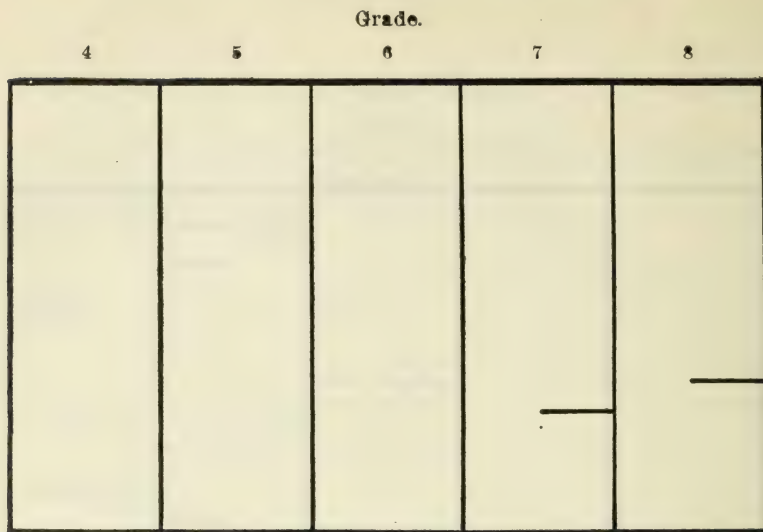


FIG. 26.—Graphical work; taught in 7 per cent of the twenty-eight schools.

TENDENCIES AS TO CONTENT OF COURSES.

Before considering the tendencies in the matter of the content of the curriculum, it would be helpful to consider carefully certain influences affecting the whole course of study in the elementary school. In order to economize space, however, a mere statement of these influences will be made. There is, among school men, and in the public to-day, an unwillingness to accept the doctrine of formal discipline as it was formerly stated, so that it is no longer possible to justify the retention of any topic or subject by claiming for it merely great disciplinary value; there is growing belief in the doctrine of interest as essential to will training, so that the possible attitude of the pupil toward a subject is taken into account more than formerly; there is greater and greater insistence upon the fact that the elementary school has as its function that defined briefly above, rather than, for example, preparation for the high school. All these influences would bear considerable discussion, for their effect upon the mathematics curriculum is very marked. For example, there is great pressure to simplify the course. This is being done by using smaller numbers in the work in arithmetic; by eliminating topics that are unduly confusing; by giving carefully graded simple problems; and by cutting down the extent and increasing the emphasis on the part that remains. There is also great pressure to modernize the course. This is being done by omitting obsolete problem material, topics, and processes, and by substituting therefor modern problem material. There is pressure to make the subject possess informational value as well as disciplinary value. This is

being done by a change in the problem material, such as introducing problems about our national resources and problems of local interest.

DISTRIBUTION OF THE MATERIAL THROUGH THE GRADES.

There are two general modes of organizing the whole course of study which have received much support. One is known as the topical plan, according to which each topic is treated once within the course of the eight grades, after which it is to be retained by the pupils. The other plan is known as the spiral plan, according to which each topic is touched upon repeatedly and more or less frequently throughout the course, so as to provide the necessary reviews. In its extreme form this plan may become highly confusing to teacher and class and may lead to a lack of sufficient concentration. The modern tendency seems to be to recognize and take advantage of the good in both plans; to adopt the spirit of the topical plan, to the extent that at various stages of the course certain mathematical ideas are stressed and certain number facts learned; and to adopt the spirit of the spiral plan, to the extent that there is frequent review of the essentials, so that the inevitable tendency of the pupils to forget is counteracted.

TYPICAL COURSES OF STUDY.

Further discussion of the content of the course might be given. As a matter of fact, there is only one satisfactory way to get a good idea of the content of any course and that is to read the course itself. This same remark might be made in regard to the subject which will be discussed in the next chapter, the matter of method in teaching mathematics, the manner in which the schools seek to influence method also being understood best by examining a course of study. Some courses of study are given in Part VI of this report.

III. EXAMINATIONS FROM THE POINT OF VIEW OF THE SCHOOL.

KINDS OF EXAMINATIONS CONSIDERED.

Although the American commissioners have assigned the subject of examinations to another committee, it seems proper to mention it briefly in this connection.

Examinations given in the school are of three kinds: (*a*) Those given by the teachers themselves; (*b*) those given by the supervising officers of the schools; (*c*) those given by a school to determine the qualifications of pupils proposing to enter the school.

The examinations given by the teacher are of two kinds; the ordinary "written recitations" and the stated examinations which may be required by school regulations. The first should not be called examinations in one sense of the word; they cover usually a short period

of previous instruction, and they are given as a means of affording the same sort of drill to all members of the class or as a means of detecting weaknesses as a basis for further instruction. Such written lessons are left entirely to the teacher, although it is advised that they be given frequently. Such examinations are in every respect desirable when conducted by the teacher with due regard for the general welfare of the pupils.

The teachers are sometimes required to give their pupils a written examination monthly, quarterly, or at some other stated times, and to use the marks obtained by the pupils for the purpose of determining their fitness for promotion. These examinations are more formidable in character; they cover a greater amount of previous instruction; and they are designed to test the pupils' power. Because of their consequences, such tests are feared by the pupils; in many cases they are considered unfair, and the result upon the pupils is a nervous strain.

The use of these two kinds of examinations is very general, and in both types the teacher is usually permitted to make out the questions. The practice of giving such examinations at the close of the year is decreasing. These tests are clearly given as an aid in determining promotion of the pupils, and it is against this type of examination that considerable criticism has been directed on account of its effect upon the pupils. In these examinations, however, the teacher usually has the power to adjust the test to the capability of her class, and in reading the papers she can allow for individual peculiarities.

The examinations given by the supervisory staff are primarily considered an administrative expedient. The questions are prepared by the superintendent, or by a committee of principals working under the direction of the superintendent, and they are then used in all of the schools of the system. The teachers have only in rare instances the right to add to or to change the questions before submitting them to their classes. The teachers mark the papers and then usually submit the results to their principals. These examinations are given for the purpose of setting standards of work throughout the system, interpreting the course of study, promoting uniformity, discovering weak points in the teaching, and revealing the general conditions in the school. In a broad way they are designed to benefit the pupils only indirectly, since the emphasis is placed upon the administrative advantages. The results may be used occasionally in determining a pupil's fitness for promotion, although it is seldom that failure in the examination alone would retard a pupil's progress. As an administrative device these examinations are effective. Their success depends upon the wisdom, the experience, and the ideals of the supervising officers. As a rule the examinations do not meet with favor among the teachers, who feel that the test

is not so much intended for their pupils as for themselves. From what has been said it is apparent that this is true to a large extent, although this depends upon the supervising force. Many of the teachers, recognizing the advantages gained through the examinations and having high professional ideals, do not take this view, however, and are willing to have their work compared with that of their colleagues. The examinations are opposed also because of their effect upon the pupils. It is contended that the pupils are subjected to a severe nervous strain, so that they do not do either themselves or their teachers credit. This is possibly true to an extent, although the evil results may be greatly lessened under wise supervision. Another objection made to such examinations is that they hamper the teachers in their work, so that there is little progress from year to year. This again depends upon the character of the supervision. Another objection made to such examinations is that fession works up to the supervising positions, and this element may be counted upon to promote rather than to hinder real progress in the schools.

REASONS FOR GIVING EXAMINATIONS.

Examinations have been ranked highly for reasons that vary according to the school employing them. Some feel that the value lies in the "mark" obtained by the pupil, this mark being sometimes counted as one-half of the pupil's standing and at other times counting as only a small per cent toward his rank in class or his readiness for promotion. Others deem that the practice in organizing quickly, in thinking clearly, and in stating accurately is the main value of examinations, a theory that tends to the use of monthly or biweekly examinations. Other schools find the worth of examinations to lie not in the benefit to the pupils (save indirectly), but in the help given to the teacher in the opportunities to check objectively her subjective ranking of pupils and of class progress. In the latter case the examination papers may not be returned to the pupils, the teacher noting the errors on which to work with both class and individuals. The other prominent reason for giving the examinations, the administrative advantages, has already been discussed.

TENDENCY IN THE USE OF EXAMINATIONS.

The present tendency in the use of examinations is to rank them as valuable but to let the value and the use of the papers be determined by the aim. When the pupils are to be benefited directly by practice (1) in separating essentials from nonessentials, (2) in clarifying a viewpoint through the enforced expression of it, (3) in learning to interpret the printed or written page independently, or

(4) in being tested on memory or power, then tests should be frequent, they should be carefully looked over by the teacher, and soon thereafter they should be made the basis of further instruction. Tests to further the first three of these ends are being given increasingly. Those tests or examinations of which the purpose is to help the teacher check her judgment of the pupils and test the portions of subject matter taught as to their relative value in giving the pupils ideals of and practice in perseverance, honesty, independent thought power, etc., need not be returned to the pupils. The teacher will note in this case the errors and will attempt to classify them; for example, as errors due to ignorance or to carelessness, those important or relatively unimportant, and class or individual errors. Such examinations are a form, and a very desirable form, of recitation.

STANDARDIZED TESTS.

Another view of the question of examinations concerned itself with "standardized tests." An investigation by questionnaire sent to a large number of schools showed that these tests are little known or used. These tests are discussed especially in a book, *Arithmetical Abilities*, by Dr. C. W. Stone, and published by Teachers College, Columbia University, New York. This book discusses certain tests given with extreme care in 26 school systems. The replies were carefully graded, the results examined, and deductions drawn. As a result these same tests can be used as a standard in other systems, giving an opportunity to compare results with those obtained in the 26 systems. Some schools and systems of schools have done this.

These tests may also be used to give a somewhat definite means of comparing system with system and to show the effects of changes in curriculum or in method of instruction, and doubtless an acquaintance with them would indicate other uses to which they could be put.

IV. METHOD OF INSTRUCTION IN ARITHMETIC.

By method of instruction in arithmetic is meant the special means of presenting certain knowledge of arithmetic to children in a way which is adapted to the immaturity of their minds. Such a method of necessity involves consideration of the subject matter selected for the course, of the organization and distribution of the material, and finally of the manner of bringing it before the pupils. The difficulty of making any general statements which shall apply to the country at large is very great, for in a country with school conditions such as exist in the United States there are and always must be wide variations in all three respects. Some common characteristics may be pointed out as being typical of the practice in the country; these may be inferred, first, from the content and organization of the textbooks,

and, secondly, from the known practice in some of the larger or more progressive school systems. There are some reform tendencies also to which attention should be directed.

Certain influences affecting the work of all of the subjects of the elementary school have produced, and are producing, changes in the method of instruction in arithmetic. On the part of the schools themselves there has been a growing regard for the ideals of psychology and pedagogy, and an increasing effort to put these ideals into practice as these have become more clearly defined. The ideal of appealing to the interests of the pupils, the maxim of allowing the pupils to learn through their own activity, the falsity of the doctrine of formal discipline as formerly understood, the clearer understanding of the processes of perception and of apperception with the resulting theory of developmental or inductive teaching—these and other ideals have led to changes in the methods of instruction from within the schools. These changes have only started, however, and the present must be regarded as a transition period. On the other hand, there have been other changes brought about as much if not more under pressure from without the school. There has been a growing independence on the part of the public in the matter of educational opinion; the result has been less acceptance as gospel of the statements of the schoolmen, more questioning of the worth of each and all of the subjects taught, and more insistent demand that the schools endeavor to provide instruction which will harmonize with and prepare for the conditions of modern life. There is on all hands growing sympathy for children, as a result of which their burdens are being made lighter, and, in particular, their period of school life is being looked upon not so much as a period of discipline in preparation for a further life of unpleasant tasks, but rather as a portion of their life which they can and should be helped to enjoy. In response to this influence, which has met with ready reception within the schools, there has come a tendency to simplify the work as much as is possible.

Instruction in arithmetic in the past has been dominated largely by a logical ideal and a disciplinary aim; these influences can be observed in the subject matter, in the organization of it in the textbooks and in the means employed in presenting it to the pupils. The criterion observed in the selection of material for the course has been "to what extent is this topic necessary to round out the development of arithmetic as a mathematical topic"; topics were selected frequently because they had certain mathematical interest rather than because they met some actual need of the pupils in either their present or later life. Long lists of abstract problems of unnecessary difficulty and complexity were introduced regardless of the fact that they were much more involved than any met in actual practice by most people. The concrete problems usually followed the abstract, were equally

difficult, and seldom were designed to appeal to the interest of the pupils; up to within recent years the problems often involved matters which are entirely obsolete. This material was organized topically; in the first chapter was given a treatment of notation and numeration which was designed to meet the complete future needs of the pupils, containing such numbers as billions, and beyond. Then followed chapters which contained the treatment of the four fundamental operations for integers, and so on through the course. Logically this arrangement was a natural one, but psychologically it was open to criticism. In the presentation of the material the book was again permeated by the logical ideal. Processes were either given by a rule followed by an illustrative example and exercises for the pupils, or some abstract explanation of the rule was attempted. The former method was the more common. This was a period of direct instruction and of drill on the part of the teacher, with little effort to provide any basis of experience for the pupils upon which they might build their arithmetic.

These ideals of instruction have by no means entirely passed, but in most of the textbooks in use now there is evidence of response to the influences mentioned in a former paragraph. This is a time of transition from the extreme of these views of the past to the more rational methods of the present. In the meantime the schools have passed through a period in which the quest after better methods has led some to adopt certain well-known one-idea methods. As examples of these may be mentioned the Grube method, with its attempted complete study of one number before passing on to the next, and the ratio method, in which the complete development of arithmetic was made to yield to a special mathematical form.

Whereas in the past instruction in mathematics in the elementary grades has been dominated by logical ideals and a disciplinary aim, at the present the leading purpose is to make the instruction as useful in content and as pedagogical in form as the conditions of school work permit. In regard to its content, remark has been made in a previous paragraph of the tendency to simplify the course through the omission of unduly complicated problems and of topics which have mathematical rather than general interest; with these omissions has come a greater insistence upon the essentials of arithmetic and additional problems whose special function it is to give the pupils an insight into certain phases of the life of their own country. The mathematician may fear that this process of elimination will result in a lower standard of mathematics; the fear is groundless, however, for the effort to direct attention to a more complete mastery of the fundamentals can not fail to raise the standard of mathematical equipment of the pupils.

Reference has been made also to the general organization of the material of the course in a previous part of this report, so that only a brief statement will be necessary at this point. The modern texts in most common use employ a combination of the older topical method and of the extreme form of the spiral method. The text is usually divided into sections which contain sufficient material for one-half year or one year. Within these sections the material is arranged topically; each section, however, reviews some or all of the topics contained in the previous sections. In this manner opportunity for review is provided and a better gradation of the material is made possible.

The remainder of this section of the report will be devoted to a brief statement of some of the special means employed for bringing the arithmetic before the pupils.

In all schools instruction is given to groups of pupils varying in number from five in small communities to thirty or even more in some of the larger communities; in cities the average is about 25. As a rule the arithmetic class meets daily for from 20 to 30 minutes, in a period called the class or recitation period; the pupils usually have another period of about the same length for study in school, giving a total of from 200 to 300 minutes per week for arithmetic. Custom in regard to home study varies; the tendency is to cut down on home study in arithmetic, except possibly in the upper grades. Each pupil possesses a book, which is more than a mere collection of problems; in fact, this book provides for many classes about all of the "explanation" or development that some of the pupils ever receive. In most cases, however, new topics are taken up in class by the teacher, who gives such development of the topic as seems satisfactory to her, after which the main responsibility of the pupils consists of the solution of similar problems in their study time. In the past it has been all too common for the class time to be occupied with indiscriminate recitation on this work done by the pupils in their study time; the present tendency is in the direction of use of this class period either for instruction on new topics or for vigorous drill upon past and present work under the direction of the teacher. Another characteristic of the class period is the rather uniform practice of devoting from one-third to one-half of the time to mental arithmetic, i. e., to computations without the aid of pencil and paper. The function of this type of work is to produce skill in mental computation, and, secondly, to maintain and increase efficiency in the portions of the subject taught previously, by having the pupils solve many simple problems.

In the actual presentation of new topics, custom varies from the unsatisfactory plan of direct instruction, of mere telling of the fact

or of the process and of drill upon it until the pupils know it, to the desirable form of presentation in which some capable teacher consciously and successfully develops the new idea inductively. One of the obvious effects of the influence of psychology upon method is the greater insistence upon inductive or developmental teaching. Unfortunately, the mass of teachers have an entirely inadequate idea of the underlying psychology and in fact of the essentials of this general mode of procedure in teaching a new topic. Most of the teachers are impressed with the need of teaching the simple before the complex, the concrete before the abstract, the special before the general; but clear-cut ideas of the philosophy of the practice and of the function of the definite stages which are possible in inductive teaching are usually lacking. This may be due to the fact that all of mathematics has been looked upon as a deductive science and that no special effort has been made to impress the idea of inductive teaching; it is probably so because little attention has been given to the problem of method as such. Progress in the direction of better understanding of the stages of mental development has been reflected in the more progressive schools in efforts to provide a teaching method in harmony with this knowledge.

The practice of using objective aids in presenting new topics is the most common result of the efforts to regard the teachings of psychology. The texts and the teachers endeavor to lay a foundation of experience for the pupils upon which they can build their mathematics, and belief in the efficacy of objective work in accomplishing this is quite general. The theory behind this belief is often the crude idea that objects help and that the younger children need this assistance more than do the older ones, with the result that objective aids have been used decreasingly from grade one to grade eight. The relation of objective work to inductive teaching has not always been clear; that the use of objects helps sometimes to present to the pupils clearly individual cases of some general idea which is being taught, out of which the pupils are to form the general idea by a process of generalization—this fact is not as widely understood as would be desirable. The result has been a certain amount of waste in the use of objective aids and consequent dissatisfaction with such work. There has been a tendency to use objects too much in the lower grades, and, on the other hand, there has been the fault of not using objects sufficiently in the upper grades. While this may seem to represent an inconsistent state of affairs, the explanation is easy; the objects have been used to excess at times with young children and then, for the reason mentioned above, when new topics have been undertaken in the upper grades, this means of aiding the older pupils has been neglected, with the result that the pupils have not always gotten clear

ideas. The great desideratum at the present time is that objects should be used more understandingly.

The material used in the schoolroom as objective aids is limited and highly artificial, consisting of tiles, pegs, splints, toothpicks, squares of cardboard, etc. This material has the special advantage of being adapted to the conditions of schoolroom work; it is inexpensive, compact, easily handled and not too attractive. Besides this material which can be handled, there is a growing use of geometrical figures, especially of rectangles; these can be quickly drawn, are easily changed and adapted to the conditions of particular problems, are divisible, in fact, lend themselves readily to the needs of the situation. The use of rectangles in teaching fractions is especially to be mentioned. In the selection of objects, two qualities which are particularly desirable, in fact, necessary in some cases, are not always realized and when realized are not always readily obtainable; these are the elements of naturalness and variety. The element of naturalness is probably sufficiently appreciated; in the early grades, the pupils themselves, the seats in the room, the material which is distributed in connection with the work of all the classes, the selection and grouping of the pupils for their games, these are some of the more natural sources of material for concrete expression of the number facts studied. Similar material for use in the upper grades is not always so readily obtained; of course, in connection with denominate numbers, the actual weights and measures are brought into the schoolrooms in the progressive schools. As much as possible, the problem material in all of the grades is selected from the experience of the pupils, and the actual conditions of some of the topics are reproduced in the schoolroom. For example, in teaching stocks and bonds, the class may resolve itself into a broker's office, one member of the class acting as the broker and the rest of the class acting as buyers or sellers of stocks and bonds; again, the class in a lower grade may resolve itself into a store with similar distribution of responsibilities among the members of the class; when discussing commercial paper and business forms, samples are brought into the classroom so that the pupils may get the feeling that there is a real connection between the work they are doing in the schoolroom and that of adults who are engaged in the work of the world. An effort is made to permit the pupils to handle the material themselves.

The other quality mentioned as desirable, namely, variety, is not appreciated as much as it should be. The advantage in having a variety of objects as a means of arousing interest is usually clear, but the necessity of variety in presenting particular cases of a general idea which is being developed inductively is not clearly understood. For example, in presenting the idea of tens, bundles of splints

containing 10 splints are often used; the pupil soon learns to associate the word ten with one of these bundles without really understanding that the bundle contains 10 splints. This difficulty is obviated somewhat by using a variety of means of representing 10. Other illustrations might be given to make the point that in objective teaching care must be taken to prevent too immediate association of the idea being taught with any particular manner of representing that idea in a concrete way.

By way of summary of this section, devoted to the discussion of methods of teaching arithmetic, it may be said that there has been great progress in establishing the principle that psychological rather than logical ideals should permeate the teaching of arithmetic, and that there has been some progress toward incorporating this principle in the actual teaching practice, in the form of objective work and inductive developments.

V. TRAINING AND QUALIFICATIONS OF TEACHERS.

SCOPE AND SOURCE OF MATERIAL.

Part V deals with the training and qualifications of teachers of mathematics in the elementary schools. It is based in large part on the report of subcommittee No. 3 of this general committee, whose field of study was limited to the training of teachers for work in grades 1 to 6. The committee appointed to study the same problem for grades 7 and 8 was unable to report up to the time when this summary was first made. That report has since been added to part (b) of this general report.

GENERAL TRAINING.

In an earlier paragraph the statement was made that in the country at large over 425,000 teachers were employed in 1906, and that about 100,000 new teachers are employed annually. Further statistics show that not more than 20,000 of these can receive pedagogical training annually as that is the limit of the capacity of professional training schools of all sorts in this country. At best, therefore, not more than one-fifth of the new teachers can have received any professional training whatever.

Generally, even in the districts where educational advantages are very meager, prospective teachers must be high-school graduates. Graduation from high school implies the completion of a course equivalent in content to the following: Three years of English, four of Latin, two and one-half of mathematics, two of science, two of history, and two years of additional subjects. In addition to this scholastic training the prospective teacher must attend a normal training school within the limits mentioned. In some States a

minimum length of time must be spent in such school. In most of the cities, in which, as has been said, more than one-half of the population is gathered, this normal training and even previous experience is absolutely insisted upon. It might be said at this point that many of the best teachers in the schools owe most of their training to the hard school of experience, especially hard when that experience consists of service in one of the rural schools discussed in chapter one. It may also be said that the larger cities seek recruits for their teaching staff very commonly from the graduates of this same school of experience.

TRAINING IN THE NORMAL SCHOOL.

The training in a normal school usually consists of general pedagogical theory, some special training in the methods of the different subjects including mathematics, some academic study of the subjects, such as algebra in mathematics, some observation of teaching, usually in all subjects, and more or less practice teaching.

From a study of the practice of the normal schools the following points of variability seem existent:

1. Method of teaching enters into "methods" courses from the extreme of being merely incidental to the other of occupying full time and attention.
2. Current literature on the teaching of mathematics is sometimes used extensively and sometimes not used at all.
3. Similarly with consideration of games and recreational devices in arithmetic; sometimes they are considered, and again not.
4. The course of study for the whole curriculum is sometimes not studied and is sometimes carefully analyzed.
5. The history of the development and of the teaching of mathematics is given similar varying emphasis.

RECOMMENDATIONS FOR A TEACHING COURSE.

1. A foundation in subject matter as a basis for the professional study of mathematics should include a minimum of one-half year of high-school arithmetic, one year of algebra, and one year of geometry.

2. Exclusive of all courses in psychology, pedagogy, principles of teaching, general method, and history of education, a minimum of one-half year of the professional study of arithmetic should be required to include the following:

A. The teaching of elementary mathematics—"Special Method."

(a) The special pedagogy of arithmetic.

1. The more elementary phases of the psychology of number.
2. Principles of general method applied to teaching arithmetic.

3. Educational values of arithmetic and the place of arithmetic in the general educational scheme.
 - (b) The organization of the general elementary school curriculum in arithmetic.
 - (c) Organization of typical units of subject matter for presentation to appropriate grades.
 - (d) Development and writing of typical plans for teaching.
 - (e) The utilization of local and general economic studies for number applications.
 - (f) Observation and discussion of typical lessons in the grades showing concrete applications of the principles developed.
 - (g) The place of games and other recreational devices in grade number work.
- B. The historical development of the teaching of arithmetic, and the place and value of certain "methods," such as those of Pestalozzi and Grube.

3. That every school engaged in the preparation of teachers of mathematics should develop a museum of materials, apparatus, books, pamphlets, papers, which will aid in interpreting such features as the historic development of the subject, the present-day practice, and the nature of the textbooks.

4. That the head of department of mathematics should be largely responsible for the organization of the course of study in mathematics in the training school, in cooperation with the department of education and the supervisor of the training school.

5. That the head of the department of mathematics should aid in the supervision of the teaching of mathematics in the training school.

6. That the head of the department of mathematics, as well as the critic teacher, should give demonstration lessons in the training school, illustrating the principles of teaching, developed in the methods class.

7. That the points of emphasis in all observations, discussions, written plans, and criticisms should be upon the basis of fundamental principles rather than upon devices or petty details.

VI. TYPICAL COURSES OF STUDY.

INTRODUCTION.

It is almost certain that much that has been given in this report will be intelligible only if interpreted. Since the main interest will probably center on the curriculum itself and upon the teaching helps given to the teachers and recommended for their use, it seems

worth while to include in this report two typical courses of study. The first is the course of study recently issued for the guidance of the teacher of the rural schools of one of our States, but generally considered too difficult in the first two years. The second course has recently been prepared for the schools of one of our cities.

A STATE COURSE OF STUDY.¹

SUGGESTIONS.

The work in arithmetic should, first of all, produce accuracy and rapidity in computation. Accuracy can be assured only by holding the pupil to exactly correct results from the beginning. Pupils should be held to correct results and made to detect and correct even the slightest error.

Rapidity of computation can be secured only through much practice and drill. Throughout the first three years of the work the entire time in the subject should be given to securing this accurate and rapid work in the fundamental operations.

While drill in the facts of number during the early grades should be largely in the abstract, with few if any problems, it is suggested that some concrete work in these combinations be given. Illustration: 5 dollars and 4 dollars are how many dollars?

FIRST YEAR.

(FIRST HALF.)

Count numbers to 100. Read numbers to 100. Write numbers to 100.

Memorize the 20 of the 45 combinations in addition, the sum of which does not exceed 9.

Give plenty of oral drill together with seat work and blackboard work like the following:

2 5 3 4 2 7	2 1 2 3 2 3 7 5 1 2 6
4 2 2 4 4 1	6 8 5 2 3 4 2 3 7 3 2

and have pupils get correct results by copying, where necessary, the results from the combinations placed upon the blackboard. This work together with oral drill and tests will in a short time fix these combinations in mind without the use of objects and the consequent formation of the pernicious habit of counting the fingers in adding.

From the first, drill in these combinations should be given in such manner as to prepare for subtraction as well as addition.

Illustration.

Teacher—Five-four?

Pupil—Nine.

Teacher—Five and what are nine?

Pupil—Five and four are nine.

Teacher—Four and what are nine?

Pupil—Four and five are nine.

¹ Prepared by the Education Department of New York State. As here given the course is somewhat abridged.

When the combinations are learned in this manner, the work in subtraction, if taught by the Austrian method (sometimes called the addition method), is learned at the same time as addition.

Illustration.

$$\begin{array}{r} 8\ 7\ 6\ 3\ 9 \\ -\ 4\ 2\ 3\ 1\ 6 \\ \hline \end{array}$$

Method.

- 6 and 3 are 9.
- 1 and 2 are 3.
- 3 and 3 are 6.
- 2 and 5 are 7.
- 4 and 4 are 8.

At the close of the first half year pupils should be able to count, read, and write numbers to 100. They should know the 20 combinations, the sum of which does not exceed 9 and their use in addition.

Objects should be used only for consecutive counting and developing the idea of number in the abstract. Children should never be taught to count two groups of objects to find the sum. This gives the idea that addition is counting, which is a serious hindrance to accuracy and rapidity in work. Nothing has done more injury in number work than the too long continued and injudicious use of objects in its teaching.

SECOND HALF.

Continued drill in addition and subtraction with the 20 combinations learned in the first half.

Count to 100 by twos, by fives, by tens.

Drill in adding columns of figures on board and cards arranged for this purpose, the sum not to exceed nine.

Memorize the remaining 25 combinations in addition.

Give oral drill, seat, and blackboard work in plenty with examples like the following:

$$\begin{array}{r} 6\ 8\ 4\ 5\ 3\ 2\ 4 \\ 4\ 3\ 8\ 6\ 9\ 7\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 8\ 6\ 9\ 3\ 4\ 5 \\ 1\ 2\ 4\ 5\ 8\ 8 \\ \hline \end{array}$$

Children are here taught to carry in addition.

Method. Teach the very best model, insist upon its exact imitation and much repetition and drill. Make no attempt to explain the process. This is the time to teach the art of computation, not the science of numbers.

SECOND YEAR.

(FIRST HALF.)

Continued drill in the use of the 45 combinations in addition and subtraction. Drill on series work in addition.

Illustration.

$$\begin{array}{r} 2\ 12\ 22\ 32\ 42\ 52 \\ 5\ 5\ 5\ 5\ 5\ 5 \\ \hline \end{array}$$

Continue drill by counting by twos, threes, fours, fives.

Illustration.

Count to 50 by twos beginning with 0, beginning with one.

Count to 50 by threes, beginning with 0, beginning with 1, beginning with 2.

Count to 50 by fours, beginning with 0, beginning with 1, beginning with 2, beginning with 3, etc.

Drill in subtraction—Austrian method.

Illustration.

1235 6 and 9 are 15.

— 786 9 and 4 are 13.

449 8 and 4 are 12.

The entire time of this half year should be given to use and drill of the facts of number learned as here specified. By the close of the period simple numbers will be added and subtracted with accuracy and facility and much progress made in the addition of columns of figures.

SECOND HALF.

Notation and numeration of numbers through first three periods.

Continued drill in addition and subtraction, especially in the addition of columns.

Memorize the 45 combinations in multiplication.

Teach these combinations so that preparation is given for division at the same time that multiplication is being taught, that is, have the pupil answer the questions, how many sixes in 24 and how many fours in 24 as well as to state that 4 times 6 are 24.

Give much oral drill, seat work, and board work of the following character:

3 2 6 4 5 3	8 6 2 4 5	2 0	3 0	4 0	5 0	6 0
2	3	2	3	4	5	6

Teach the process of carrying in multiplication.

(1) A good model. (2) Imitation of the model. (3) Repetition, drill. (4) No explanation.

THIRD YEAR.

FIRST HALF.

Continue drill in counting. Count by fives to 100, beginning with 0, beginning with 1, beginning with 2, beginning with 3, beginning with 4. Count by sixes, beginning with each of the numbers from 0 to 5, inclusive.

Short division with 2, 3, 4, 5, 6, 7, 8, and 9 as divisors. Give thorough and systematic oral drill as a preparation for this work. Before asking a child to use 2 as a divisor, he should be able to tell instantly how many times, with remainder, 2 is contained in every number to 20. When 3 is used as a divisor, a similar drill should be given in numbers to 30, with 4 to 40, with 5 to 50, with 6 to 60, with 7 to 70, with 8 to 80, with 9 to 90.

Multiplication with two or more figures in the multiplier.

Definitions of terms used in fundamental operations. Addend, sum, minuend, subtrahend, remainder, multiplicand, multiplier, product, dividend, divisor, quotient.

Continue drill of all previous work.

Measures—areas of simple figures with use of ruler correlating with drawing. Dimensions used inch and foot. Square inch and square foot, and the fractions $\frac{1}{2}$ and $\frac{1}{4}$ as applied in the use of the linear unit used in measuring.

SECOND HALF.

Long division. Never allow a child to use long division when the divisor is a single figure.

Multiplication tables of the tens, elevens, and twelves and their use as divisors in short division.

Begin long division with easy divisors of two figures. Remember that 31, 41, 51, 61, 71, 81, and 91 are easier divisors than 14, 15, 16, 17, 18, and 19, 27, 37, 58, 76, etc.

Give much oral drill and written work for accuracy and rapidity in all of the fundamental operations.

Tests for divisibility of numbers by 2, 3, 5, 9, 10.

Definition of factor, prime factor. Memorize prime factors up to 25 (1, 2, 3, 5, 7, 11, 13, 17, 19, 23).

Oral drill in finding prime factors to 100.

Continue measurement of objects in schoolroom for surface measurement. Additional measure: The linear yard. Learn liquid measure of pint, quart, gallon.

At the close of this year's work the pupils should be able to add, subtract, multiply, and divide numbers with accuracy and facility.

FOURTH YEAR.

FIRST HALF.

Roman numerals I to C and by hundreds to M.

United States money. Writing and reading of numbers expressing dollars and cents. The use of this knowledge in problem work demands its introduction at this time.

Simple problems, oral and written, connected with daily life. Original problem work by the children. Problems in bills and accounts, especially where one of the factors is 12 or less the extension of the products making up the sum to be done mentally.

Teach cancellation. Have all problems stated before being worked. Use cancellation whenever possible in the solution of these statements.

Dry measure: Pint, quart, peck, bushel. Problems in reduction only.

Simple fractions and equivalents. Develop objectively. Also teach idea that a fraction is an indicated division with the dividend above the line and the divisor below it.

Fix the principles: (1) Multiplying the numerator or dividing the denominator of a fraction by any number, multiplies the fraction by that number. (2) Dividing the numerator or multiplying the denominator of a fraction by any number divides the fraction by that number. (3) Multiplying or dividing both numerator and denominator by the same number does not change the value of the fraction.

Continue drill throughout the year in the fundamental operations. Facility in these operations demands that this work be continued daily throughout the entire course.

Changing fractions to equivalent fractions of higher and lower denominations.

Give much oral drill in changing fractions to equivalent fractions of higher and lower denominations and in reducing them to a common denominator. Denominators of these fractions should not exceed 24.

Make little use of denominators 13, 17, 19, 29, and 39.

Addition and subtraction of fractions, the denominators of which do not contain more than two figures.

SECOND HALF.

Addition and subtraction of mixed numbers involving fractions already used in the manner here indicated. (Mixed numbers should never be reduced to improper fractions in addition and subtraction.)

Least common multiple of numbers to 100 and application in reducing fractions to a common denominator. (Use method of factoring in equation form.)

$$\begin{array}{ll} 45 = 5 \times 3 \times 3 & 5 \times 2 \times 3 \times 3 = \text{L. C. M.} \\ 30 = 2 \times 3 \times 5 & 5 \times 3 = \text{G. C. D.} \end{array}$$

Multiplication of—

1. A fraction by an integer.
2. An integer by a fraction.
3. A fraction by a fraction. Use cancellation in all cases where possible.

Written work in preceding cases should be preceded by much oral drill with simple numbers.

Division of—

1. A fraction by an integer.
2. An integer by a fraction.
3. A fraction by a fraction. Use cancellation whenever possible.

Have the written work preceded by much oral drill, as in multiplication of fractions.

Continue the solution of problems involving the principles and processes learned in all previous work.

Problems to be stated before being solved, including oral analysis.

Cubic measure. Volume involving cubic inches, cubic feet, and cubic yards.

FIFTH YEAR.

FIRST HALF.

Reading and writing of decimals.

Reduction of common fractions to decimal fractions and decimal fractions to common fractions.

Fundamental operations in decimal fractions. (The Austrian method of placing the decimal point in division is recommended.)

Memorize the aliquot parts of \$1 or of \$100.

Review tables of linear measure, square measure, and cubic measure.

Memorize number of cubic inches in a bushel and in a liquid gallon.

Reduction ascending and descending as applied to these tables.

Application of square measure to finding area of squares, triangles, rectangles, and to problems in painting, carpeting, and plastering.

Application of cubic measure to finding volume of rectangular solids, the capacity of bins and cisterns, cost of masonry.

(Teach accurate capacity by using 2150.42 cubic inches in a bushel; also approximate capacity by using one bushel equal to $\frac{5}{4}$ cubic feet. In liquid measure use 231 cubic inches to gallon, also $7\frac{1}{2}$ gallons = 1 cubic foot.)

SECOND HALF.

Memorize tables of avoirdupois weight, dry measure, liquid measure, English money, time, and circular measure. Also learn number of pounds in a bushel of potatoes, wheat, corn, barley, oats, barrel of flour, and apply in the solution of problems. Also learn value of franc, pound, and mark in United States money.

Reduction ascending and descending as applied to these tables.

Other tables in denominate number besides those memorized may be used in problems, but pupils should be allowed to refer to books for facts used.

Problems in the form of bills and accounts continued.

SIXTH YEAR.

FIRST HALF.

Review the work of fractions, with special emphasis on the three questions:

1. To find a fractional part of a number.
2. To find what fractional part one number is of another.
3. Given a fractional part of a number and its relation to the whole, to find the whole.

Illustration: $\frac{3}{5}$ of 35 = ? What fractional part of 35 is 21? 21 is $\frac{3}{5}$ of what number?

Review denominate numbers and drill on industrial problems demanding their use.

Fundamental operations in percentage:

1. Any per cent of any number. Aliquot per cents. Use the term per cent interchangeably with hundredths. Learn thoroughly the aliquot parts of a unit and use interchangeably with hundredths and per cent. (See table given in first half of fifth year.)
2. The per cent one number is of another.
3. One number is a given per cent of what number?

Applications to problems.

SECOND HALF.

1. Profit and loss, including (a) marking goods; (b) trade discount; (c) cash discount.
2. Commission—using only practical and common problems.
3. Simple interest.
 - (a) To find interest on any sum of money for a given time at a given rate.
 - (b) The making of promissory notes and the computing of interest thereon.
 - (c) Problems in interest when three of the elements of P, R, T, and I are given to find the fourth.
4. The simple equation and the use of the unknown quantity x can be profitably used in the solution of some problems.

SEVENTH YEAR.

Pupils who have completed the work of the six preceding grades should be able (1) to read reasonably large numbers at sight and to write numbers rapidly from dictation; (2) to add problems 5 figures wide and 20 numbers deep ac-

curately at a fair rate of speed, i. e., in about two minutes; (3) to perform all fundamental processes in arithmetic rapidly and accurately; (4) to reason quickly and explain simple problems; (5) to handle ordinary fractions—common and decimal—without hesitation; and (6) to comprehend the fundamental principles of percentage and their applications.

At the end of the seventh year any one of the following courses may be pursued: (1) To follow syllabus in algebra for the eighth grade; (2) to give a part of the time to arithmetic and a part to algebra; (3) to give the entire time to arithmetic.

If the study of arithmetic is to stop with the end of the seventh year it will be advisable to follow the syllabus for this year and to include such topics of the eighth year, i. e., stocks and bonds, insurance and taxes, as are deemed necessary to round out the subject.

If the arithmetic is to continue through the first half of the eighth year, leaving the other half free for algebra, it will be necessary to select those topics in arithmetic which are considered essential to the laying of a proper foundation for the study of advanced arithmetic. Under this condition it will be necessary to eliminate some topics in the eighth grade algebra.

If arithmetic is to be given in both the seventh and eighth years it will be possible to insure greater efficiency along industrial and commercial lines through reviewing, drilling on, emphasizing, and enlarging upon those processes and applications which are considered the essentials. Without attempting to follow the syllabus it is possible to introduce some algebra in the solution of problems in mensuration and interest by means of the simple equation and the use of the unknown quantity x .

Give plenty of oral drill in getting approximate results. This will tend to reduce error in computation. In business it is customary to apply some kind of a check to every result obtained. No good mechanic or business man would think of letting his results stand without some checking. Pupils should acquire the verification habit.

Mental arithmetic should occupy a large share of the time. Never allow pupils to use pencil if, in your judgment, the result should be obtained mentally.

In general, papers should be marked, as they are in business, largely by the accuracy of the result. If the result is wrong the paper is wrong. If the problem requires some interpretation a teacher may quite properly mark both for accuracy and for method.

Teachers should endeavor to get outside of the book and to have a large amount of drill material ready for each exercise. Use the mimeograph, or some other duplicating machine in the preparation of lessons. Teachers should, if possible, learn the business methods used by a mason, carpenter, paper hanger, painter, architect, banker, etc. Original problems can be obtained from these men and pupils may be sent to them to verify their own methods. The problems should be real if they pretend to be so. They should relate when possible, to the child's daily environment and to his other school work. They should be concerned with the school shop, drawing, and laboratory work. They should touch the questions of the supply of food, clothing, and shelter as related to our farms, shops, transportation facilities, to typical industries, and distributing centers.

Visits to the shops of craftsmen and trips to factories, banks, and business houses will clear up in the minds of the pupils the technical points involved in such problems and will add new interest to the work. The daily activities of our people must be drawn upon to make the arithmetic interesting, informational, and practical.

FIRST HALF.

1. Continue application of percentage—

- (a) Interest, including commercial paper: (1) Six per cent method and short methods based upon it; (2) bank discount; (3) compound interest as applied to savings-bank accounts. Use tables in compound interest. The operations of depositing money, drawing checks, and figuring interest should become as real as the school can make them.
- (b) Problems should be many but simple. Many should be oral. In many cases discuss the solution without requiring any actual computation. Drill on giving approximate results.

2. Ratio and simple proportion.

Ratio has some use apart from being an introduction to proportion. Fertilizers, metals, and liquids are mixed in given ratios. Proportion may be merely one method of writing simple equation. The relation of numbers expressed as ratios should be shown and simple problems involving proportion should be given. The use of the equation and the unknown quantity x should be used.

3. Powers and roots—

- (a) Memorize squares of numbers to 25. Oral drill in their use.
 - (b) Square root and its applications in determining dimensions from areas of squares. Also its use as applied to the right triangle. Square root is necessary for the purposes of mensuration. However, its study has more value in training for reasoning than in its practical use, since many who use it employ tables. Pupils can comprehend it by the use of the diagram or by the formula.
4. Many miscellaneous and review problems should be given. The use of the equation and the unknown quantity should be used, whenever convenient, in their solution.

SECOND HALF.

1. Review the following tables until the pupils use them readily in their work. In the review of the tables of measures some attention might be given to the origin of such measures as yard, foot, inch, quart, acre, etc. In this way the pupil will find the work taking on new interest. (1) Measure of length, (a) linear; (2) measure of area, (a) square; (3) measure of contents and capacity, (a) cubic, (b) dry, and (c) liquid; (4) measure of weight, (a) avoirdupois; (5) measure of quantity, (a) paper; (6) other tables, (a) circular, (b) time; (7) money, (a) United States, (b) English.
2. Review of, and drill in mensuration, using practical problems involving surfaces of (1) parallelogram, (2) rectangle, (3) triangle, (4) circle, (5) trapezoid and contents of such solids as (a) cube, (b) sphere, (c) cylinder, (d) pyramid, (e) cone.

Strict geometrical demonstrations can not be given, but enough objective work can be offered to make the matter clear.

3. Begin by using problems all of which require the use of the same table and then drill on mixed problems, making them practical and real as far as possible. Teachers are advised that it is of little value for the pupil to memorize tables that are not to be used in practical life, or to commit to memory numerous equivalents that are readily found in the textbook when needed.

EIGHTH YEAR.

FIRST HALF.

1. Rapid calculation work.

In this drill include daily speed exercises. Set a reasonable time limit and hold the class up to it. This will fit the pupils for pressure work which is bound to come in business life. It may include practice in the following:

- (a) Addition until pupils can add at the rate of from 75 to 100 figures per minute. Use group method.

Horizontal addition should be practiced. Example: 10 pieces of cloth—38, 82, 91, 46, 53, 67, 84, 75, 65, 69=670, at 50c=\$335.

- (b) Multiplication, when multiplier is 11, 22, 33, 44, etc. Example: $892 \times 11 = 2$ as unit figure; $(9+2=11)$ 1 as tens; $(8+9+1 \text{ carried}=8)$ 8 as hundreds; $(8+1 \text{ carried}=9)$ 9 as thousands; final result 9812. Example: $596 \times 22 = 13112$. Same as preceding process except that each addition is multiplied by two before carried figure is added.¹

- (c) Cost of articles sold by ton of 2000 pounds. Example: 8942 pounds at \$25.50 per ton = $\$8.942 \times (\frac{1}{2} \text{ of } \$25.50) = \$114.01$.

- (d) Interest practice, short method given above. Only a few practical short methods should be given. This work will help to sustain interest and develop rapid thinking power of concentrated effort.

2. Business forms.

Some drills should be given in making such forms as the following: (a) invoices or bills; (b) statements; (c) account sales—in commission.

It is not expected that the pupil will be taught an elaborate form of book-keeping; but everyone should know how to keep simple accounts. These can easily relate to the income and expenditures of daily life in the home and on the farm.

SECOND HALF.

Stocks and bonds:

Pupils should know what a corporation is, its chief officials, its organization, its stocks or bonds, and its methods of declaring and paying dividends.

- (a) Cost of a given number of shares at a given market value.
 (b) Number of shares or bonds that can be bought for a fixed sum.
 (c) Rate of income on an investment in stocks or bonds.

Insurance:

Insurance, fire, life, and accident, is an important factor in our life, and yet the technicalities in various types of policies, especially those of life insurance, are so difficult of comprehension that the school can hope to do no more than to give a general conception of the work of the various kinds of companies and to confine the problems to the simplest practical cases that the people need to know about.

Taxation:

The subject of taxation has a close relationship to civics, and when combined with it has a real interest to the pupils. It should be treated from the standpoint of local conditions.

Algebraic notation:

Algebra has some place in this grade, especially for the boys in the industrial course. Simple formulas are now quite common in the various mechanical trade papers. Many of these boys will have use for various mechanics' pocket tables, which involve the elementary operations and linear equations. Em-

¹ The committee does not feel called upon to comment upon such features as this. It must say, however, that the carrying of this work beyond 11 is not warranted.

phasis should be laid upon the study of formulas, so that the simple algebraic expressions of the trade journals and mechanics' handbooks may be read easily.

RELATION TO MANUAL ARTS, HOUSEHOLD ARTS, AND AGRICULTURE.

Those schools that offer instruction in household and manual arts and agriculture have an excellent opportunity to relate this instruction to the book-work. A series of problems vitally relating to cooking, sewing, woodworking, mechanical drawing, and farming may be worked out. Such problems will not only touch the school life of the pupils but also the home life.

The suggestive outlines showing this relationship are not limited to a single year; neither are they necessarily entirely taught by the teacher of arithmetic. They furnish a splendid field for coöperative effort between the special teachers and the room teachers. Each might well know what the other is doing, and attempt to fix in the pupil's mind the applications of arithmetic to school and home life.

Portions of these outlines are common to the needs of both sexes. Certainly both should have a knowledge of home accounting. However, the division of hand activities into home-making courses for girls and manual training and agricultural courses for boys means that the most effective correlation will be brought about by a differentiation of the arithmetic according to sex and occupational interests.

OUTLINE RELATING TO HOUSEHOLD ARTS.

1. Simple domestic bookkeeping, including daily, monthly, and yearly supplies for the kitchen.
2. Calculation of the prices of foods bought in large or in small quantities as related to the cost of meals for the home.
3. Study of the simple measurements as needed in the household, including measurements of materials used in food and clothing.
4. Cost of furnishing a kitchen, laundry, dining room, living room, and bedroom, with the expense of renovating and maintaining them.
5. Relative cost of different systems of heating and lighting; reading a gas meter.
6. General questions of maintenance of the home, including rent, water, taxes, insurance, and interest on the mortgage.

OUTLINE RELATING TO MANUAL ARTS.

1. Adding the detailed dimensions on the school sketches and drawings for the "over-all" dimensions.
2. Figuring the cost of the materials used in the article made, including the lumber, screws, stain, and varnish.
3. Working out a more elaborate cost slip of the object made; i. e., reckoning the compensation for labor, the cost of power, the interest on the money invested in the school shop, etc., as well as the bill for materials.
4. Making out a bill for the general lumber supply of the school, using the actual market prices.
5. Laying out of simple geometrical forms in wood; i. e., hexagonal taboret—calling attention to the value in degrees of the angles.
6. Proportion as applied to the speed of the wood-turning lathe, taking the speed of the motor as a basis.

OUTLINE RELATING TO AGRICULTURE.

1. Actual measurements by the class of small plots of land, calculating their area. Measurements of walls, fences, and calculating their cost.
2. Measurements of and calculating the capacity of tanks, cisterns, watering troughs, silos, storage bins, and barrels. Data may be obtained from the home equipment.
3. Special computation suited to farm practice such as income from dairy cows, feed rations, farm labor.
4. Business forms, such as inventories, time books, stock accounts, cash accounts, notes, receipts.
5. Application of percentage in study of soil composition, ratio and proportion in relation to animal feeds, practice in estimating amount of material for such spraying; i. e., emulsions, poisons, and fungicides.
6. List of materials showing cost of such farm buildings as house, barn, poultry house, cornerrib.

A CITY COURSE OF STUDY.¹

GRADE 1.

SECOND HALF YEAR.

Numbers through 10: counting forward and backward; relative values of numbers which make 10; writing the names of numbers in words and figures.

GRADE 2.

FIRST HALF YEAR.

All the work of this grade should be objective.

Counting by tens, fives and ones to 100; relative values of numbers within 100.

Numbers through 20: counting by twos, fours and fives. Counting backward by ones, $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ of numbers from 1 to 20, inclusive, which give an integer as result.

Measures used—inch and foot.

SECOND HALF YEAR.

Addition and subtraction of numbers through 14; multiplication and division through 20; writing numbers through 100; $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ of numbers from 1 to 20, giving an integer as result. Addition of single columns, using the combinations learned.

Measures used: Inch, foot, square inch, square foot, pint, quart.

Review very thoroughly the work of the first half year. Teach addition and subtraction of numbers through 14; multiplication and division through 20. Teach signs for all processes, using the terms *and*, *less*, *times*, *contains*, and *equals*.

Simple concrete problems should be given, using the combinations learned. The order of presentation should be: 1. Objects, in learning combinations. 2. Concrete examples (oral) with objects present. 3. Representation of combinations by figures. 4. Recalling combinations without objects; thorough memorizing of results. 5. Concrete problems without the use of objects. These problems should be very simple and based upon the child's experience. Very little written work should be required and the result should be stated in a sentence without any attempt to show the process. Readiness in finding the

¹ Prepared for the schools of Indianapolis, Ind. The course as here given is necessarily much abridged.

result of the combination of any two numbers is to be considered of first importance in this grade, because this knowledge must be at command in all succeeding stages of advancement. The addition of short columns, using only the combinations learned, gives additional practice; it is an excellent method for review.

GRADE 3.

FIRST HALF YEAR.

Addition and subtraction of numbers through twenty; multiplication and division tables through fours; abstract addition, two columns; writing of numbers through one thousand; Roman notation through one hundred. Fractions, $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$.

Measures used: Inch, foot, square inch, pint, quart, gallon.

SECOND HALF YEAR.

Addition and subtraction by "endings" through 2+9. The four fundamental processes—multiplication and division tables through fives. Multiplication and division of abstract numbers through thousands; use 2, 3, 4, and 5 as divisors. Addition and subtraction of United States money. Writing numbers through ten thousand. Roman notation through one hundred.

Application of fundamental processes to simple concrete problems of one step.

Measures used: Inch, foot, yard, square inch; pint, quart, gallon; peck, bushel; second, minute, hour, day, week, month, year. Use actual measures. In connection with the units of time, call attention to the method of telling the time of day by the clock.

GRADE 4.

FIRST HALF YEAR.

Addition and subtraction by "endings" through 4+9. Multiplication and division tables through nines. Multiplication of abstract numbers by two digits. Short division, using for divisors all numbers below 10. Addition, subtraction, and multiplication of United States money. Writing numbers through millions.

Fractions $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$. Aliquot parts, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{10}$, as applied to 100 only.

Measures as in Grade 3, and in addition, the ounce and pound. Use actual measures.

SECOND HALF YEAR.

Addition and subtraction by "endings" through 9+9. Multiplication by three figures. Long division. United States money, addition, subtraction, multiplication, and division.

Fractions, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, and $\frac{1}{32}$.

Pupils of this grade should become accurate and skillful in addition and subtraction of integers. Begin the work of the term by making sure that pupils can add and subtract by endings unflinchingly. Subtraction by endings is especially likely to be neglected. Require pupils always to check their addition by adding the columns in reverse order. Similarly subtraction should be checked by the reverse process of addition. Thus $13 - 9 = 4$, is checked by the process $9 + 4 = 13$. Do not allow pupils to indicate "borrowing" by changing the digits in the minuend.

At the beginning of the term, make sure that every pupil has mastered the multiplication combinations through the tables of twelve—not only when given in serial order (9×3 , 9×4 , 9×5 , etc.), but when selected at random (9×4 , 7×9 , 12×11 , etc.).

Use multipliers of not more than three figures in this grade. Introduce zero into the multiplier often, as it is troublesome.

Pupils should always check multiplication by going over the work carefully, adding the partial products in the order reverse to the first addition.

It should be remembered that pupils will fail in the long division process as long as they have not mastered multiplication and subtraction.

Pupils should always check long division by going over their work carefully, using the reverse process of addition for each subtraction.

To insure mastery of the division process, after the process is acquired give a problem each day, either in long or short division, during the remainder of the term.

Mental or oral arithmetic should be given daily in abstract and concrete problems, for at least one-third of the arithmetic period.

GRADE 5.

FIRST HALF YEAR.

Review of essential processes taught in preceding grades. Long division. Reduction, addition, subtraction, and division of fractions. Aliquot parts: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{6}$, $\frac{1}{8}$. Mental arithmetic.

Pupils should be able automatically to add and subtract by endings and to use the multiplication combinations through 12 times 12, before beginning the fractional work. While the fractional work is being developed in class time, the written work should consist almost entirely of review problems. Enough practice should be given in long division to enable pupils to use the process accurately and fairly rapidly. Insist upon the use of short division where the divisor is less than 13.

The chief difficulty that pupils have in acquiring the fractional processes is to interpret clearly the unfamiliar, and so perplexing forms and terms used. The problem of the teacher therefore is to enable pupils to interpret these conventional symbols into terms of their own experience. To this end pupils should first learn to objectify the common fractional quantities, halves, thirds, fourths, sixths, eighths, and twelfths. Pupils should compare these fractional parts when applied to actual objects (oranges, apples, sheets of paper, etc.), and to representations of objects by drawings. Drawings should be used very largely for objective development in this grade, as they make possible a much wider application of the fractional parts than would be possible with a few objects. The drawing, moreover, is the natural step between the object and the abstract symbol. Whenever a drawing is used the child should think of it as representing some definite object.

Mixed numbers, proper and improper fractions.—Develop these terms objectively by paper folding or from drawings. Pupils at first read a mixed number, $2\frac{3}{4}$, as 2 whole and $\frac{3}{4}$ of a whole. They should realize that an improper fraction is equivalent to a mixed number with the wholes cut into the same sized parts as those indicated by the fraction and all of these parts combined.

Reduction.—Pupils should now specialize in the following processes until they are skillful in the use of them, approaching each from the objective point of view.

a. Reduction of integers and mixed numbers to fractions.

b. Reduction of improper fractions to integers or mixed numbers.

c. Reduction of fractions to higher and lower terms. The work in this last topic should be especially thorough, as addition, subtraction, and division of fractions usually involve one or both processes.

Addition, subtraction, and division of fractions.—Pupils that have had the above preparation will have no difficulty in acquiring skill in the use of these processes if abundant practice be given. It should be recognized that the business world seldom deals with fractions whose denominators are higher than 16, preferring to use decimals for all such fractions. This should cause the teacher to drill largely upon fractions of the larger denominations (with small denominators).

Finding the least common denominator (by inspection only) should be taught. Denominators too large for this method should not be used.

SECOND HALF YEAR.

Review of preceding essential processes. Multiplication of fractions. Addition, subtraction, and division of decimals. Aliquot parts: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{5}{6}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{1}{12}$, $\frac{1}{16}$. Mental arithmetic.

Make clear to pupils that a fraction may be expressed in a variety of ways: (1) Five hundredths; (2) 5 hundredths; (3) $\frac{5}{100}$; (4) .05.

The last way is called the decimal form, because it is used only to express fractions whose denominator is ten or a multiple of ten.

At this point lead pupils to see that a fraction has two meanings:

First. The meaning that they, as primary school children, were taught to attach to it—namely, that a fraction expresses a certain number of equal parts of a unit.

Second. The meaning that the mathematician often attaches to it—namely, that a fraction is an expression of division, in which the numerator is the dividend and the denominator is the divisor.

GRADE 6.

FIRST HALF YEAR.

Review of essentials. Multiplication of decimals. Percentage, first case. Denominate numbers and measurements. Bills and receipts. Mental arithmetic.

Teachers should, at the outset, determine which pupils can not add and subtract readily and use the multiplication combinations automatically, and assist them to overcome these fundamental weaknesses. The first two or three weeks should be used in a thorough review of the essential processes. Teachers should, throughout the term, emphasize the work in all the decimal processes so that the pupils may acquire skill in the use of them before leaving the grade.

In this grade give only the first view of percentage. For this reason confine the work to an explanation of the way of reading and writing per cents, to teaching the connection between per cents and integers, and to finding given per cents of numbers. Keep the work simple, using only whole numbers of per cents. For example, use 4%, 5%, 6%, etc., but not $4\frac{1}{2}\%$, $6\frac{2}{3}\%$, etc., in this grade. Some suggestions:

(a) Teach percentage as a phase of multiplication of decimals.

(b) Teach the idea of per cent by finding, orally and in writing, hundredths of given numbers, expressing the written work at first by the common and then by the decimal form of the fraction. After the pupils

have a clear idea of finding hundredths of a number decimally, give them the percentage form of notation and expression; i. e., tell them that 0.05 is written 5%, etc. They should learn to associate hundredths and per cents.

- (c) Give the pupils wide experience in changing decimals to per cents and per cents to decimals, using integral numbers of hundredths.
- (d) Give the pupils wide experience in finding by the decimal process a given per cent of a given number. Do not introduce during this term the difficulty of deciding whether or not to use the common fraction or the decimal fraction equivalent of a given per cent; that is, use always the decimal fractions.

Denominate numbers and measurements should receive a thorough treatment in a practical way in this grade. Teach the necessary tables of denominate numbers. Some of these tables the pupils already know, whereas others they will now meet for the first time.

- (a) The pupils should memorize thoroughly these tables, excepting that every item which modern business does not require the average man to know should be excluded; more definitely teach the following tables: time, weight, dry measure, liquid measure, linear measure, square measure, and cubic measure.

Ask the pupils to bring to school bills that have been used in business transactions. Talk them over with the class, showing the advantage of the conventional forms of ruling, heading, receipting, etc. The pupils should be asked to make out bills first on blank forms, if they can be obtained, afterwards on paper which they have ruled themselves. Let their imagination be used to make these business transactions represent actual transactions as far as possible. Let it be imagined or represented that the teacher or one of the members of the class has sold the rest of the class a bill of goods or done a piece of work for them, or rented a house to them. The resulting bill should contain the real names of the parties to the transactions. The pupils should learn how to receipt a bill properly and also how to give a receipt for any obligation; that is, an account settled, rent paid, wages received, and part-payment receipt.

All processes and subjects taught in this grade should be introduced by simple work given orally. After a principle has been taught a large number of simple exercises should be given in mental arithmetic, so that the pupils can become sure and skillful in the application of the process. Mental arithmetic should be given daily for one-third of the recitation period.

SECOND HALF YEAR.

Review of all essential processes previously taught, as follows:

- (a) Addition and multiplication combinations.
- (b) Notation and numeration of integers, Arabic and Roman; fractions, common and decimal.
- (c) Reduction. Changing denominate numbers to higher and lower denominations; a common and decimal fraction to higher and lower terms; changing mixed numbers to improper fractions, and the reverse process; changing decimals into common fractions and common fractions into decimals.
- (d) Addition, subtraction, multiplication, and division of integers; common and decimal fractions; denominate numbers.
- (e) The use of the common aliquot parts.

Percentage.

Measurements.

Simple bills, accounts, and receipts.

Mental arithmetic.

The purpose of the review work in this grade is to establish a strong foundation for future mathematical study by making pupils sure and skillful in the use of the essential processes previously studied, and by revealing to them the unity of the subject as based upon the two general underlying principles.

At the outset the teacher should make sure that every pupil can add and subtract accurately and use the multiplication combinations automatically. All cases of "arrested development"—such as counting in adding, adding instead of using the multiplication combinations, and writing down numbers to be added to the next higher order in multiplication—should be earnestly sought out and corrected. The teacher, particularly of this grade, should feel that unless this fundamental work is thoroughly accomplished her work in arithmetic is, to a considerable extent, a failure.

Pupils should now be able to read and write the quantities, appearing under various forms, which they will need to use. They will probably have no difficulty with common fractions and denominate numbers, but they may need considerable drill in integers, Arabic and Roman, and in decimals. Their knowledge of the Roman system will be used almost exclusively in connection with the numbering of chapters in books, and it should be taught with this in view. Drill only upon numbers below C.

In the decimal notation considerable drill may be necessary before the pupils will readily associate the name of the order with the number of decimal places.

Sufficient drill should be given to enable pupils to reduce denominate numbers to higher and lower denominations and to give them proficiency in changing fractions to other fractional forms; common and decimal fractions to higher and lower terms; improper fractions to mixed numbers, etc.

It should be the aim of the teacher to keep the percentage work entirely on the thought side, avoiding all formulas or rules. The work includes the relation between common fractions, decimals, and per cents; the finding of a given per cent of a number; the finding of a number when a part is given; and the finding what part one number is of another.

"Gain and loss" should not be taught as an independent topic, for the problems which come under this head can be classified with the three kinds of percentage problems mentioned above. If it is clearly established with the child, by means of blocks or by representation by drawings, that the selling price is always made up of the cost with a part of itself added or taken away, according as there has been a gain or a loss, he will have no difficulty with these problems.

In connection with the percentage work, pupils should acquire facility in the use of the common aliquot parts. Those that are easily computed (as $\frac{3}{4}=60\%$) should not be committed to memory, neither should those that are not commonly used (as $\frac{5}{8}=31\frac{1}{4}\%$). Pupils should learn, however, to compute quickly the decimal equivalent of any fraction, by expressing the numerator as a decimal and dividing by the denominator. An excellent drill consists in counting by fractional parts, giving at the same time the decimal or per cent equivalents.

In measurements, review the work with the rectangle, square, triangle, cube, distinguishing them from each other and associating these geometrical names with the figure already familiar.

The problems under this head should be practical. Require pupils frequently to make their own measurements in order to obtain the conditions of the problems they are to solve. Illustration: Find the dimensions of your schoolroom. What is the total area of the walls and ceiling? How much window surface? How much blackboard surface? Determine the cost of sodding the yard of your school and inclosing the school yard with a fence.

One good way of treating this topic is to work out problems in connection with building and equipping a house or the school building. If a building is being erected in the neighborhood, it should be used for this work in order that the problems may be real.

In order to train pupils to keep simple accounts—an accomplishment that everyone should possess—teachers are requested to have at least one exercise a week in which the children make a record of their income and expenses. This exercise need not occupy an entire period. Except when class instruction is needed, the records may be made before school, or at odd times.

The accounts should be of actual moneys belonging to the pupils, if that is possible. It is better to have a briefer account and have it a real one than to fill it with fanciful transactions or family transactions. The accounts should indicate briefly, but adequately, the sources and dispositions of income; not Rec. from Aunt Mary, but Gift from Aunt Mary; not Paid out, but Paid for candy; not Earned, but Shoveling snow, etc. The headings at the top of the pages should be uniform through each book—either Received—Paid, or Income—Outgo, or Receipts—Payments. Balances should be computed at the close of each month. These balances should be properly brought down by use of red lines, if possible, and carried forward to the next month's account. Begin each month on two new pages, with proper statements of amounts brought forward from previous month. Have a uniform use of capitals and punctuation. Pupils may keep memorandum slips, but entries in the account books should be made in school, with ink, and accounts should not be copied. Accounts through vacations should be kept in memorandum form and entered in the books in school after vacation. The accounts will be opened October 1 and February 1 and be continued through the 6A grade only, including vacations. Account books will be furnished this grade.

Ask the pupils to bring to school bills that have been used in business transactions. This work is review, and pupils should become proficient in making and receipting bills of various sorts that are used in the common business of life. Make the work practical, and frequently during the term give practice in this work.

All processes and subjects taught in this grade should be introduced by simple work given orally. After a principle has been taught a large number of simple problems should be given in mental arithmetic exercises, so that the pupils may become sure and skillful in the application of the principle. Mental arithmetic should be given daily for about one-third of the recitation period.

GRADE 7.

FIRST HALF YEAR.

Review of essential processes. Applications of percentage (commercial discount, commission, taxes, simple interest). Constructional geometry. Mental arithmetic.

First make sure that all pupils can use the fundamental processes skillfully. If weaknesses are revealed, test for addition endings and multiplication combinations and follow up all deficiencies until they are overcome.

Devote the first two or three weeks—more or less, according to the class—to a review of the essential processes. It is only when a good foundation is established in this review work that the best results in the advance work can be assured.

Do not allow pupils to become confused by the new terminology found in the applications of percentage to various kinds of business. Cause them to see that

these involve the identical principles and processes which they used in their study of percentage in the preceding grades. Keep the work simple, practical, and in accordance with present business methods. Train pupils to investigate by polite and pointed inquiries the different kinds of business studied. The information thus gained should be reported to the class in an interesting and profitable manner.

The subject of commercial discount is of great value because of its extensive use "from wholesale transactions down to bargain sales." Pupils should understand some of the reasons for allowing discounts. Buying in large quantities, paying "cash down" or within a specified time, the usual deductions from list prices, etc. It would be well, for obvious reasons, to review bills and receipts in connection with the study of this topic.

Let the pupils interview commission merchants and obtain conditions for some practical problems, and, at the same time, a social interest in this important business. Eliminate all problems that state that the sum of money sent includes the commission and the price of the goods bought, as this is contrary to business practice.

The subject of taxes should be treated briefly. It should be shown that there is expense involved in conducting the affairs of a city. To make this concrete, use as an illustration the fact that the public schools are dependent upon the taxpayers for their support. Point out the necessity of each citizen paying his rightful share of the public expenses of government. The simple mathematical work in the subject may be developed by the analogy between levying a city tax and taxing the members of a ball team to meet its expenses. The attempt in the former case to apportion the taxes, according to the individual's property, may be brought out by the contrast in this respect between these two illustrations of taxation.

Confine the work in this grade to the subject of municipal taxes, discussing the subject only in a simple way. Use the current tax rate in problems.

Present conditions so that the child can discover that interest is merely a form of percentage with the time element introduced.

One arithmetic period each week should be devoted to the geometry work. The purpose of the work is to teach pupils to use the few mechanical drawing instruments which they buy, and to acquaint them with some of the essential fundamental terms and principles of geometry.

SECOND HALF YEAR.

Review of essential processes.

Problems of the home. Grocery, meat market, department store problems. Making change. Cost of heating and lighting the home. Cost of furnishings for the home. Other problems relating to the cost of food, heat, light, clothing, etc., for the family.

Saving and investing money. Saving money. Investing money. Banking. Interest. Real estate. Loans.

Constructional geometry.

Mental arithmetic.

In the problems for the home this city provides data in a pamphlet on community arithmetic.

These problems are designed to give drill upon the essential processes through the use of such problems as are met by individuals in their daily life. They are to be solved upon the basis of current prices in every case. For this reason it is important that the teacher should get in advance a list of the items, together with the current prices. These problems are the kind all of us as

purchasers should be prepared to solve mentally, or if not so, then in writing with very brief notes; they are the kind that salesmen and clerks are called upon to solve in their daily work. The problems will be found useful for both mental drill and for written lessons.

The department-store problems are designed to meet the criticism of store men that both clerks and the public are unskillful in the solution of such simple problems as occur in the conduct of a department store.

Give problems showing that small daily and weekly savings will amount to large sums in time; that money may often be saved by making cash payments rather than paying by installments or buying on credit; that it is more economical to buy in reasonably large quantities; that the cheapest things are sometimes the most expensive in the long run.

Consider the various ways of investing money: Banks and trust companies; real estate; loaning money. Establish the economic principle that the higher the rate of interest offered by an investment, the greater the risk involved; also, that the element of safety in investments is of far greater importance than the amount of income from them.

The bank is the most commonly used means provided for the safe-keeping of money. Certain kinds of banks—for instance, savings banks and trust companies—not only guarantee to take care of all money left with them by depositors but they also pay a certain per cent of interest.

When practicable, pupils should go to a bank and ask some official to show them about the bank. Report what you learn to the class. Ascertain what officials there are in the bank, and the duties of each.

Many schools have found it interesting and profitable to organize school banks, electing the officers and carrying on a regular banking business, either with small amounts of real money placed on deposit by pupils and transferred by the teacher to some bank or trust company, or with imitation money, which can be made by cutting out rectangular pieces of paper for bills and circular pieces for coins, marking on each piece its denomination.

Teach the method of depositing money, of drawing checks, of borrowing money, and of discounting notes.

Not less than one arithmetic period a week should be devoted to the geometry work. The purpose of the work is to teach pupils to use the few mechanical drawing instruments which they buy and to acquaint them with some of the essential fundamental terms and principles of geometry.

The aim of each exercise should be clearly stated to the pupils and they should be led, so far as practicable, to think the successive steps to the conclusion. In other words, make it a thinking exercise rather than a mere dictation exercise. Encourage pupils to use their instruments as much as possible in the mensuration work in arithmetic, in the art work and manual training work, and whenever they will be serviceable.

GRADE 8.

FIRST HALF YEAR.

Review of essentials.

Problems relating to the industries of the city and State. Manufacturing interests of Indianapolis. Manufacturing interests of Indiana. Problems met in certain lines of work; some railroad problems; foundry problems; problems of buying and selling paper; making out a pay roll.

Paying and collecting money by checks, drafts, and money orders.

Generalized arithmetic and equations.

Proportion.

Mental arithmetic.

Instead of the above, the Latin classes take algebra; however, in these classes also, drill in the previous arithmetic work so as to maintain efficiency.

In the eighth grade, problems relating to the interests of the city are prepared and are issued in pamphlet form.

SECOND HALF YEAR.

Review of essentials.

Generalized arithmetic and equations.

Stocks and bonds.

Insurance—fire, life and accident.

Cost and support of our Government. Cost of city schools. Cost of city government. Money raised by taxes. Money raised by sale of bonds. Money raised by special assessment.

In treating of stocks and bonds show that a great deal of the wealth of the country is invested in the various kinds of business which supply our wants and minister to our welfare. Name a number of the business enterprises in or near your community which are owned and controlled by single individuals; a number in which more than one person have invested their money. Show that much of the business of the country is now carried on by these corporations—for instance, railroads, trolley systems, and many of the large manufactories. The money contributed to carry on these industries is represented by bonds or certificates of stock, which are bought and sold like land or merchandise. Explain the fluctuation of stocks and the difference between stocks and bonds.

Pupils can find the market price of the more common stocks and bonds quoted in the daily newspapers, and while studying this subject they should follow these quotations from day to day. Explain the abbreviation "pfd." (preferred), and the difference between preferred and common stock. Most railroads and many other business enterprises issue these three forms of securities—bonds, preferred and common stock. Pupils should study these different forms of securities as issued by some local corporation, as a traction company or railroad.

The work in stocks and bonds will be limited to the finding of the cost of a given number of shares of stock or of a given number of bonds, at a given market price, and to the finding of the income from a given number of shares of stock or a given number of bonds.

Insurance should be studied for its informational rather than its mathematical value. Three kinds of insurance should be briefly and simply discussed—life, accident, and fire.

Pupils should understand the underlying principle in insurance; paying a relatively small, but carefully estimated sum of money to a company for their guarantee to pay a very much larger sum of money in case of a specified contingency.

They should understand the following terms: Policy, premium; "straight life" and "endowment" policies; "good" and "poor" risks.

The problems in the cost and support of the Government should be designed to maintain and increase efficiency in the essential processes of arithmetic through constant application and to convey information concerning matters of local or national interest, of which all citizens should have some knowledge. This aspect of the work is designed to correlate with the work of the civics class. The problems should afford opportunity for the use of the four fundamental operations with integers, percentage, and some of its applications.

SUBCOMMITTEE 2. MATHEMATICS IN THE KINDERGARTEN.

In the early history of the kindergarten as an educational movement, there was a somewhat unanimous opinion current regarding the direct mathematical training and the instructions to be given to the children through concrete experiences with Fröbel's educational materials.

The gifts and occupations (the technical names given to Fröbel's play materials) form a related series planned to meet the creative and constructive impulses of the child, through activities involving the analysis and synthesis of geometric forms. The gifts begin with the ball (sphere), the cube, and the cylinder, progressing through the analysis of these to the study of surfaces, lines, and points. The occupations are based upon such activities as perforating, sewing, drawing, weaving, the folding and cutting of paper, and modeling. They reverse the geometric evolution, embodying the synthesis of form from the point, through lines and surfaces, back to the solid.

The traditional method of using these materials in the early history of the kindergarten tended toward a much more direct process of instruction, bringing to the children a consciousness of the geometric relations embodied in the gifts and occupations.

As the modern primary school reduced the amount of conscious arithmetical knowledge and instruction in the course of study for the younger children, a parallel movement took place in the kindergarten. As a consequence, the more direct method of mathematical instruction, which the geometric basis of the Fröbelian materials made possible, gradually gave place to a more indirect approach to number, measurements, and geometric relations, through a more incidental, organic, and fundamental emphasis upon these aspects of the materials in the moral activities of work and play.

The present tendency seems to point toward a valuation of the mathematical possibilities of the Fröbelian materials as means to a higher end; that is, as structural, functional, or organic means necessary to realize the playful, the creative, or constructive impulses of the child through which these mathematical values may begin to come to consciousness.

The fact that the Fröbelian gifts and occupations are based upon a geometric analysis and synthesis of form, need not reduce or interfere with their creative and playful opportunities, except in the hands of a kindergartner who clings to the formal use of them as a means of direct mathematical instruction. On the other hand, the very fact that their structure and use involve such unconscious activities as counting, addition, subtraction, multiplication, and division, some consciousness of these mental processes and their results will grad-

ually come to the child whether the teacher emphasizes or ignores them.

The very nature of the material familiarizes the child, through playful concrete experiences, with the mental processes involved in the solution of problems in fractions and all the elementary activities of mathematics which may be brought to consciousness later through the more direct methods of instruction in the elementary school. To what degree the mathematical values involved in these playful activities should be brought to consciousness at the kindergarten period, is still under discussion, with much less decided differences of opinion than would have been apparent five or ten years ago.

While the structural and functional use of the activities of counting, measuring, adding, subtracting, and dividing seems to be on the increase, there is an equally evident growth in the appreciating of the fact that they must not be left to chance experience without due attention to ways and means for providing opportunities for further progress. In other words, there is a decided feeling that in mathematical experiences, as with all others in the kindergarten, the teacher must provide conditions which insure steady progress from the simple to the more complex, from the unconscious activities involving mathematical values to the more conscious abstraction of these, and to a continuous growth in the appreciation and control of the mathematical possibilities which are normal to the child at this period.

As a knowledge of mathematics in some form underlies all industrial activities of mankind and in the foundation of all true proportion in the art world, the kindergarten brings the child to a gradual consciousness of numerical and geometric relations, the former by such features as simple counting, measuring, and adding, as his work and play may demand, and the latter by the use of the geometric gifts and not by abstract exercises. In this way the younger children get arithmetical and geometric impressions incidentally, and the older children come into a more definite knowledge of mathematical relations, and thus begin an intelligent mastery of the material world.

The kindergarten which represents the progressive school makes no attempt to teach mathematics in a formal or direct way, since the child of kindergarten age is not interested in and can not grasp anything so abstract as number or geometric form apart from the use he may need to make of each in carrying on his play activities successfully. But in his experimenting and play with different materials he discovers certain facts in regard to number and special relations; for example, that if he uses four of his eight building blocks to make a square table, he has four left to use as chairs. Later he will make use of the knowledge thus gained, and will acquire further knowledge of the same sort in his efforts to carry out his ideas and purposes.

Often the hand work requires the division of material into halves, quarters, etc., or some material needs to be measured and cut to fit. Through such experiences the child acquires a working knowledge of certain satisfactory methods of dividing and measuring material. Furthermore, he becomes familiar with a number of geometric solids through using them in building, and he learns to select the kind that will best express his idea. The same is true of his work with paper cut in the form of squares, circles, and triangles. The games sometimes call for the grouping of children in threes or fours, and there are many occasions when counting is advantageous. The child in the kindergarten thus gains considerable knowledge which may be termed mathematical. Such knowledge comes at first incidentally and unconsciously through play, and later as the result of conscious efforts to reach ends which appeal to him as valuable.

After due investigation an effort was made by this committee to arrive at some conclusion regarding the amount of mathematical knowledge which kindergarten children could acquire, without direct instruction, through the normal activities of work and play. As a result the committee has agreed upon the following:

(1) Ability to count up to 35 or 40 can be secured through the children's helping to keep the daily record of attendance.

(2) Ability to know and name correctly the sphere, cube, and cylinder, and the most characteristic surface forms such as circles, squares, rectangles, and the right triangles.

(3) Ability to know groups of objects up to five or six.

(4) Ability to know, construct, and use intelligently halves, thirds, and quarters, by the help of blocks and the kindergarten occupations.

(5) Ability to add, subtract, divide, and multiply small numbers through constructive play. For example: (a) $2+2$, $2+3$, $2+4$, $3+3$, $3+4$, $4+4$, $5+5$; (b) 2×2 , 2×3 , 2×4 . (c) $4-2$, $6-3$, $8-4$.

As to method, the committee calls attention to the following points:

(a) The concreteness of the work.

(b) The work is functional and structural, as means to an end, through the activities of work and play.

(c) Knowledge is acquired through self-active experience.

(d) In an incidental but not accidental fashion, as a result of definitely planning the experiences which involve steady progress in the use and control of mathematical facts, the child comes to realize ends that are of worth and interest.

That a better knowledge of the child is leading to a greater unanimity of opinion is quite evident from this report, since it is prepared by members who were selected because they were supposed to represent widely different points of view that obtained a few years since.

SUBCOMMITTEE 3. MATHEMATICS IN GRADES ONE TO SIX.

I. INTRODUCTION.

As four definite topics were assigned the committee, it was agreed to divide them among the four members other than the chairman, so that each could do intensive work on one topic. The chairman was thus left the task of checking each by doing extensive work in all the fields designated. The topics were consequently assigned as follows:

Topic a.—The organization of schools and the general relation of each kind of school to the others.—Miss Julia Martin, Howard University, Washington, D. C.

Topic b.—The mathematical curriculum in each type of school.—Miss Harriet Peet, State Normal School, Salem, Mass.

Topic c.—The question of examinations from the point of view of the school.—Dr. C. W. Stone, State Normal School, Farmville, Va.

Topic d.—The methods employed in teaching mathematics.—Prof. Henry Suzzallo, Teachers College, Columbia University, New York City.

The reports on these topics naturally overlap in certain investigations. As originally prepared they contained numerous graphs and statistical tables, embodying many scientific data, and only the exigencies of publication prevent their appearing in complete form. All have necessarily been condensed for present publication.

The chairman gathered her data in narrower fields, but in the same way as did her colleagues, namely, by—

(1) Personal conferences during eight months with hundreds of teachers, met at institutes and in conventions, at teachers' meetings and study clubs. (2) Correspondence with teacher friends in almost every section of the United States. (3) Study of text books and manuals in mathematics, published during every decade since 1860. (4) Study of methods in mathematics as given in all forms of pedagogical writings during the last 50 years. (5) Examination of courses of study issued by four State departments, five State normal schools, six city systems, and five private schools. (6) Testing several fifth grades in one city by means of Dr. Stone's "standardized tests." (7) A careful study of examination questions issued by teachers, superintendents, and State departments. (8) A questionnaire given to about 300 normal-school students.

The questionnaire was formulated to secure evidence on topics *b*, *c*, and *d*. Plainly, during the last 10 to 15 years (when the students questioned were in grades one to six) arithmetic grew yearly a more vital part of the course of study, being "the subject most emphasized," being most often "the subject governing promotion," and being the subject in which the majority of the so-called "brightest" pupils "excelled."

The course of study as recalled limits the fundamental operations applied to both integers and fractions, leaving all "extras" to the seventh and eighth grades. One interesting fact was the great uni-

formity in distribution of arithmetic topics; the students questioned had had their early training in at least 10 different States, and in no less than 100 different schools.

On the question of examination over 87 per cent had to take examinations, the majority taking them either monthly or semi-annually. In general the examination counted for one-third to one-half of a pupil's promotion average. Eighty-two per cent objected to examinations, usually because the student was "nervous," "worried," "afraid," or filled with "dread," but occasionally because the test seemed unfair or caused cheating.

These same students imagine (in a few cases only they "know") that only 78 per cent of the teachers favored examinations, fully one-third of this number favoring them only because "it was a duty to be met." At least 22 per cent of teachers are thought to object to examinations.

The questionnaire gave little help on the question of change in methods, since students were plainly influenced by very recent work, or else could not write out the explanations they had once had. Ratio work was evidently little understood, students almost invariably using one as the only basis of comparison. If they had ratio work since they left the intermediate grades, it must have appeared so difficult that they think young pupils should still be taught the to them easier or simpler way of returning to one each time.

The chairman made her report in full before the individual reports were received (or, at any rate, opened), so that the unanimity of opinion as to present conditions and marked tendencies in the teaching of mathematics displayed in the five separate reports prepared at great distance from one another, based upon different sources of information, and frequently overlapping, gives one confidence in the validity of the results indicated.

In recasting the whole for publication, extra effort was given to eliminating whatever did not bear directly upon the topic of mathematics as taught in grades one to six of the general elementary schools, public and private.

TOPIC A: THE ORGANIZATION OF SCHOOLS AND THE GENERAL RELATION OF EACH KIND OF SCHOOL TO THE OTHERS.

A fair degree of uniformity marks the organization of schools in the different States of the Union, only such variations being noticeable as would naturally come from difference in (*a*) age of the settled territory, (*b*) density of population, and (*c*) inherited ideals.

First, we note two large classes of schools, public and private. The first group naturally divides again into three subdivisions, namely—

(*a*) Those found in rural communities, and called "ungraded schools," "country schools," "rural schools," "district schools," or

“parish schools,” according to the locality and the educational system. As rural communities increase their wealth, their ambition for educational advantages, and their interest in educational problems, new forms of these rural schools come into existence, called “semi-graded schools,” “consolidated district schools,” “township high schools,” etc.

(b) So-called “graded schools,” found in smaller as well as in large cities. Such a city system usually consists of an “elementary school”—eight years of work, divided into primary, including kindergarten if given, intermediate, and grammar grades—and a “secondary school” or “high school.”

(c) Those schools which the State or Government at large supports, the only ones of these which include grades one to six being (1) schools for abnormal and indigent children and (2) elementary schools in connection with normal schools and with such State universities as have a department of education and maintain a “practice school.”

The relationship between these subclasses of public schools is very slight, rural schools being largely autocratic, in spite of existing school boards and county superintendents, whereas graded systems, also (nominally) under the jurisdiction of the county superintendent, are in smaller cities much more democratic, though perhaps plutocratic in large cities where specialists supervise the work, while schools of the third class might, in a similar way, be denominated as bureaucratic. Of course, schools for defectives, incorrigibles, etc., do not pretend to employ the same materials of education nor the same standards of scholarship as do the other classes of schools. Theoretically, if not actually, normal school and university “model schools” establish the standards for their State. They are organized to further a threefold function: (1) “Model” instruction for pupils attending, (2) opportunities for practice in teaching by the students of the main school, and (3) opportunities for testing out theories of education by professors of the different departments. Different schools may emphasize one or the other of these functions, but the three are still ever present. Because of the relationship between these functions, the curricula, the grading or organization, and the methods of instruction employed in a normal school, for example, are usually submitted to the faculty for discussion, so that the result represents a “cabinet” conclusion, and therefore is authoritative; usually, though not always, being adopted by other schools of the State.

Specialists who supervise the work in large cities have not the help of such discussions and must grow somewhat autocratic in the selection of subject matter and of method, the system being too large for them to get the expression of teachers in the same way that a superintendent may in a smaller city where all of the teachers know all the phases of work and so feel freer to express their opinions.

The rural school is organized with one teacher for all grades and for all subjects, with many classes to be heard daily and with long periods between recitations for each individual pupil. The county superintendent, with large territory to cover and with bad roads and inclement weather to work against, sees the teacher very seldom; the directors are inclined to visit the school still less frequently than does the county superintendent; so that the rural teacher is truly absolute monarch in his dominion, and, if he profits by his own mistakes, there is no better training for any teacher than just this independent battling with the problems of the professions.

A glance at the second class of schools, those not supported by public funds, reveals very few schools which contain grades one to six. In the United States comparatively few parents send either boys or girls away from home to school before they are 12 or 14 years of age, so that most preparatory departments in academies, colleges, etc., begin with work ranking in difficulty with that done somewhere from the sixth to the eighth grade. Some technical schools, trade and night schools, a few philanthropic schools like those of the Educational Alliance in New York and Hull House in Chicago, and some private schools like the Lower Shattuck (Faribault, Minn.), and the Horace Mann and Ethical Culture Schools of New York City, contain all the lower grades and deserve our study, but as these schools usually form no part of a "system," each stands alone in its organization, and consequently in its curriculum, both being largely based upon the aim which actuated the founding of the school.

TOPIC B: THE MATHEMATICAL CURRICULUM IN EACH TYPE OF SCHOOL.

Rural schools have the reputation of doing a greater amount of mathematics in grades one to six than other classes of schools, and though the studies made for this paper gave no proof of this, it may well be true, for such a result would be the natural outgrowth of (1) the old-time emphasis upon mathematics as a test of "brightness;" (2) the consequent selection of teachers (the "brightest" students of a community) good in mathematics, so that they probably taught this science better than they did other subjects, or, if not, they at least continued the emphasis upon it; and (3) the organization of the rural school, with its one teacher, many classes, and much necessary seat work or independent study. Since assignments in mathematics could be easily made and most easily corrected, since to have "ciphered through the book" was a mark of distinction, and since pupils who had any ambition to attain this distinction could thus be kept "in order" for long periods, mathematics came to form a major part of the curriculum of the rural school. Prof. W. S. Smiley's statement¹ that rural pupils are superior to urban pupils is of interest here, even

¹ Journal of Educational Psychology, vol. 1, no. 9.

though it deals with eighth-grade pupils, and probably contains some error in comparisons.

The graded school, with the necessity for meeting the wider and more varied interests of the city, naturally feels that other subjects must be given equal prominence with mathematics. The organization of the work usually permits one teacher to have a single grade, with two or at most three divisions in a room, so that long study periods are unnecessary. These two influences tend to make mathematics less prominent in city systems than in the rural districts. Changes in method, usually first adopted by city systems, also contribute to changes in the mathematical curriculum, so that we usually find graded-school curricula placing mathematical topics from one to two years farther up the grades than do rural schools. One influence that has been strongly felt in this postponement of difficult subject matter is that of the kindergarten, comparatively recently made a part of public primary education, it having begun as an independent factor. Before this, the tendency had been to push subjects lower and lower into the grades to meet the demands of the secondary school which in turn was dictated to by college and university. Out of the conflict which naturally ensued there has arisen much earnest thought and discussion over the mathematical curriculum of the common school, no decision as yet being reached. Nevertheless, through examination of courses of study and through the returns from some questions propounded to normal-school students, it appears that within a small range of variation the schools of the United States have fallen into a fairly uniform course of study in arithmetic.

A study of textbooks in common use shows a very marked change throughout the course in the sort of problems given as means of applying these fundamental operations. The latest and best arithmetics choose material closely related to daily life, so that children can not fail to feel a greater and more reasonable need of the mechanics of mathematics—a more “rational motivation” for the subject than pupils of the past could ever have felt.

TOPIC C: THE QUESTION OF EXAMINATIONS FROM THE POINT OF VIEW OF THE SCHOOL.

The writer's report on this topic is less valuable than on the others, because (1) the topic seemed difficult of interpretation, (2) the questionnaire given failed to limit the question to examinations in mathematics, and (3) the student's answers about time spent, etc., proved unusable.

To get the view of “the school” it was decided that one must know (1) the view of teachers, both from their own and their pupils' standpoints, and (2) the view of superintendent and supervisors whenever such view proved more representative of the “school's” attitude than

did the feeling of the teachers. Finally, the report is based upon very limited resources, viz: (*a*) The study of a few books or chapters dealing with the reasons for giving examinations, (*b*) an inspection of some examination questions given by different schools and State departments of education, (*c*) the giving of Dr. C. W. Stone's tests to a number of classes, and (*d*) such general information as a teacher naturally acquires during several years' experience.

Even to the present time examinations have been ranked most highly, but for different reasons by different schools. Some feel that the value lies in the mark obtained by the pupil, this mark being made a definite test of his ability, and upon it depending very largely his rank in class and his readiness for promotion. This belief causes great stress to be laid on "finals." Others deem the practice in organizing quickly, in thinking clearly, and in expressing accurately to be the main value of examinations. This theory tends to the use of monthly or biweekly examinations. Still other schools find the worth of examinations to lie not in a benefit to the pupils (save indirectly), but to the teacher, giving her, as they do, opportunities to check objectively her subjective ranking of pupils and of class progress. In this case, the examination papers are never returned to pupils, the teacher merely noting errors on which to work with both class and individuals. Yet other schools stand strongly for more or less frequent examinations, because of the chance this gives the superintendent to check the results obtained by different teachers, and to locate the cause of any unusual divergence from the norm, whether the cause lie in the teacher, in the pupil body, or in the course of study. Other reasons are advanced, but these are sufficient to illustrate their variance.

The present attitude and seeming future tendency concerning examinations is to rank them as valuable, but to let the value, and the consequent use made of the papers, be controlled wholly by the aim. The benefit to the pupils arises largely through practice (1) in separating essentials from nonessentials; (2) in clarifying a viewpoint through the enforced expression of it, or perhaps through its defense; (3) in learning to interpret the printed or written page independently, i. e., without the teacher's voice or eye or gesture to guide; or (4) in merely being tested upon memorized facts, which, though not the most vital thing in education, are yet the basis for all comparing, relating, and judging that are to follow. With this aim the tests should be frequent, should be carefully looked over by the teacher, and very soon thereafter should be made the basis of further class or individual instruction.

One proof that the first three forms of practice are growing in importance to teachers is found in the very different sorts of questions asked to-day from those of a decade or more ago. The earlier purely

memoriter questions are giving place to those which require old knowledge, not as isolated bits, but as knowledge to be utilized in new situations, to be marshaled quickly at will, and arranged logically, i. e., to questions which demand thought, judgment, choice, defense of opinion, etc.

Those tests, examinations, or parts of examinations whose purpose is to help the teacher check her judgment of pupils and test the portions of subject matter taught as to their relative value in giving the pupil ideals of and practice in persistence, honesty, independent thought-power, etc., need not be returned to the pupils. Though the teacher seems by this means to be saved considerable labor in checking errors, attempting to grade each paper justly, etc., the conscientious teacher has still the task of noting errors and classifying them in various ways; for example, errors due to ignorance or to carelessness; those relatively important or unimportant; class or individual errors; errors to be immediately dealt with or those which may better be handled each time an opportunity offers and so must be kept constantly in mind.

Were the correcting not so burdensome, many teachers would increase rather than decrease the frequency of examinations, especially if the time could be set and the questions made out by the teachers themselves. The greatest complaint about examinations comes from teachers who feel strongly that questions made out by any other person than the teacher of the children tend to become of the mechanical or memoriter type. Particularly is this resented when questions have so become, and when no latitude is given either pupils or teachers, i. e., when no account (in a large system) is taken of the personal equation, and when teachers and pupils are measured by these tests alone. As superintendents and supervisors make broader studies in these fields, they recognize the need of allowing for individual differences and the cause of the above complaint is fast disappearing. Without doubt a movement in the right direction is being made by Dr. Stone and others who are working out standardized tests, and it is hoped that this work will continue, being constantly improved and made more far-reaching in its effect. That superintendents find the returns as valuable in checking up their teachers as teachers do in checking up their pupils must be recognized by all.

To summarize, then, little change is seen in the value placed upon examinations; but marked changes are occurring in the type of the questions. The formal, lengthy, memoriter type which counted much in promotion and class ranking is rapidly changing to the type which is only another means of teaching, another form of recitation, a test similar to that which life daily demands of us, viz, to know some things perfectly, to relate these things to new situations, and thus quickly to solve new problems.

TOPIC D: THE METHODS EMPLOYED IN TEACHING MATHEMATICS.

In no other field under discussion can tendencies be more clearly noted than in this one of methods. Though many methods are still in use, there has been within a decade a most decided veering from mechanical rule-of-thumb methods to thought methods.

The present chaotic state of our methods in mathematics seems due to a number of causes, some of which are (1) the various views of what number is; (2) difference of opinion as to what shall be selected from the whole field to be taught in grades 1 to 6 of the elementary school; (3) the bondage we are in to past ideals; (4) the inertia of the school itself or the slowness with which a great institution like the school changes; (5) recent marked progress in the industrial world, demanding different life preparation of elementary school graduates; (6) social progress; and (7), though by no means least, the great demand for teachers, a demand so urgent that we press into service vast numbers of immature girls who, though earnest and zealous, yet lack that higher and broader professional training spoken of by Münsterberg which makes a teacher see the aims of education and know well the means available for meeting these aims.

The many methods which these causes produce may, after all, be classed into two main divisions—mechanical and thought—though it is true that most methods are a decided mixture of the two.

By mechanical methods we mean such as emphasize the symbol, the form, the expression, to the subordination, or even exclusion, of the thought, the content, the meaning. In direct opposition to this, thought methods, while not ignoring expression, lay greatest stress upon meaning.

Though the various views of what number is give a very different content to the number symbols in common use—that is, 2 may mean how many, how much, location in a series, the ratio of one magnitude to another, etc., according to the individual's view of the essentials of the number idea—yet, thought methods ever give this content first place, whereas mechanical methods center about the symbol. It is to be noted, however, that the human mind tends to make automatic, mechanical, or formal whatever it can. That symbols, then, incline to supersede meaning is due to very natural causes: (1) All must admit (*a*) that conventionalized symbols are needed to insure race progress, (*b*) that the higher the degree of conventionality the further is the symbol removed from its meaning, and, consequently, (*c*) that with this greater conventionality there is increased danger that the child may never get the meaning, that the symbols will grow to have undue importance to him so that he may, indeed, become a mere juggler with figures; and (2) if it is admitted that even any part of the science of number deals not with things but with relations of things, it must readily be seen what difficulty children have

in giving symbols any real content. Therefore has the teaching of the past, in a more or less conscious effort to meet children's needs, vacillated from too abstract teaching to teaching so concrete as to hide relations, or, in other words, from no attempt to make children understand, from avoiding content and giving rules and form to be mechanically learned, to such profuse and such long continued use of objects in trying to give a content to number that thinking has been retarded.

But that, in spite of our keeping away from either extreme, there is still an inevitable tendency among pupils to become formal even in what seems real thought work was proved satisfactorily to a group of observers who gave Dr. C. W. Stone's tests to one class of pupils, and, a month later, gave the same children the thought-test problems which they had not done, at the blackboard where work could be watched and where there was a chance to question the pupils. We were convinced that many of what seemed like thought processes really went off mechanically when the cue was at hand. Additional problems were given to the children, among them, this: A man hitches up a horse to a buggy and drives three hours at the rate of six miles an hour. How much farther would he have gone if he had hitched up two horses? All but one child doubled the distance. This child thought "no farther." Questioning this one child brought out from the others that the two horses would help one another so that some more distance would be covered, but certainly not double the distance. Another problem tried with many more individuals was the following (changed, in different cases, to sheep or dog on two or on four legs): If a duck weighs three pounds when it is standing on one leg, what does it weigh when standing on two? It is the exception to receive any other answer than twice the original number of pounds.

Though this remarked tendency to cast even the thinking into habitual forms must be watched throughout the early years of school life, it yet must be agreed that life demands that we learn many processes automatically. The error of the past was that these processes were the beginning and the end of the teaching. A more thorough study of method in all fields shows us that men have ever passed through three stages in the development of any field: (1) Simple or natural art, or mere manner of doing the deed; (2) conscious attention to the method, running into science; and (3) art again, finished art this time.

Methods which are predominantly thought methods plan (1) that pupils begin with content (having first felt some sensible reason for approaching the subject); (2) that they then pass to a use of symbols, to be handled automatically when expediency demands it, employing a particular form of expression only because that form best expresses

the thought held; (3) that pupils are encouraged in flexibility of expression as well as of thinking, the former, however, always being controlled by the latter; and (4) that pupils are given many opportunities to exercise choice and judgment in applying the knowledge gained to life situations.

Games, plays, and construction work are some of the means employed by many grade teachers to give content to, or else a rational motive for, many phases of number work, e. g., number combinations, United States money, and fraction study.

During the current year the writer has witnessed the teaching of some arithmetic lessons dealing with (1) finding areas, perimeters, etc.; (2) subtraction; (3) areas of triangles; (4) fractions; (5) commercial discount; (6) interest; and (7) insurance. The methods employed were mainly thought methods, for each time such an appeal was made to pupils' acquaintance with life situations as to make the plan in common use a most sensible one to the child, a plan he might even think out by himself, and never have given to him as a rule to be learned. The symbols or forms of expression grew from the children's hunting the best expression to say what they thought, and though they were plainly guided into adopting conventional modes of expression, the pressure was ever from the thought side.

Modern psychology, which emphasizes the formative as well as the revealing function of expression, enables us to select our methods of procedure as well as our mathematical curriculum with much more reason than did our predecessors in education. Though in the main content should precede form, there will ever be found situations which demand form before content, or if not before content, at least without content at the time of use. When thought methods are in the main employed in the presentation of such work the teacher is first sure that she has the content herself, then she presents the process in a way to make pupils recognize its rationality, even though they can not and perhaps should not be asked to explain; drill follows, and yet demands on thinking are made throughout; applications continue the thought work, but the wise teacher patiently waits for maturity to bring full interpretation. (Long multiplication might be cited as an illustration of such work.)

Finally, methods of teaching arithmetic, besides depending upon the subject matter chosen by makers of the curriculum, vary according to the aim of teaching mathematics held by the teacher, the school, or the community—whether the end of it all is technical skill for utility or economic purposes, whether it is formal discipline or culture, whether it is to interpret the quantitative side of life experiences, or whether it is a union of all these aims. Furthermore, the still more specific method selected for each recitation in mathematics

is determined by the narrow result desired or the means at hand for realizing this end, and hence often is, or may be, (1) objective, concrete, and rationally motivated, if a new topic is to be developed; (2) abstract and mechanical, if drill or mere repetition is the object; and (3) objective again, and full of original thought work, when application is the motive.

In conclusion, then, it appears that (1) the aims of teaching mathematics, the selection of subject matter, and the methods employed are constantly acting and reacting upon one another, so that a study of all is necessary to an understanding of one; (2) that topics in arithmetic for grades one to six are being rationally motivated, and processes are being steadily rationalized to the child; and (3) that thought methods are gaining ground.

II. THE ORGANIZATION OF SCHOOLS AND THE GENERAL RELATION OF EACH KIND OF SCHOOL TO THE OTHERS.

A. EXTERNAL ORGANIZATION OF THE ELEMENTARY SCHOOL.

The present organization of the elementary school is very difficult to describe, because of the many factors that have contributed to its upbuilding and the great variation that exists. We have no central school organization in the United States; each State is supreme in educational matters. The work of the United States Bureau of Education is advisory, instructive, and inspirational. It collects and publishes statistics in regard to educational matters at home and abroad; it publishes many fine articles and documents; but its greatest power lies in the way it unifies and shapes the educational thought of the country. School legislation is in the hands of the lawmaking body of each State, and the executive authority is vested in a State department. The officers of the State department are State superintendent and State board of education. The duties of the State superintendent vary in the different States, but in general, he has charge of the certification of teachers, State institute department, collection of statistics, the making of a course of study for the rural schools, publishing of bulletins on teaching, publishing of an annual report in regard to the work of the schools, and the apportioning of school funds of the State. In the States where the office of State superintendent has been dignified by giving it large opportunities and supreme authority in carrying out school matters the position is one of great honor and the educational affairs of those States are on a high plane.

The State board of education varies in its powers and functions. In some of the States it has entire charge of the normal-school system (Michigan, Illinois, Massachusetts, and Connecticut), while in others

its duties are conducting examinations and certifying teachers (California and Kansas). In the States where the board is made up of educators rather than politicians the influence is marked.

The political division of the State is the county, and the educational organization has the same unit. The county officers and the county organization vary sectionally. In the South the county is the smallest political unit, while in the North the county is divided into towns or townships, and in most States the townships are divided into school districts. The reason for this difference is historical and industrial. The southern colonies had the county unit probably because of the method of holding land. The large plantations gave a thin and scattered population, and thus a large area was necessary for a unit of government. Elementary education in the southern colonies was largely in the hands of private schools, and not until after the War of 1861 did State organization of school systems become universal. The county following the political division is generally the unit of school organization at the South. Louisiana calls the county the parish.

The county school organization is in the hands of a county superintendent or county commissioners and a county board, sometimes called board of examiners, in all of the States except those of New England. The office of county superintendent is generally an elective one,¹ and the duties vary from mere clerical work to real supervision of school organization and classroom teaching. "The county superintendent of schools shall have the general superintendence of the public schools in his county, except those in the cities which are organized under special law and those in special or independent school districts, and shall visit each public school under his supervision. He shall at such visits carefully observe the conditions of the school, the mental and moral instruction given, the methods of teaching employed by the teacher, the teacher's ability, and the progress of the pupils. He shall advise and direct the teacher in regard to the instruction, classification, government, and discipline of the school and the course of study. He shall keep a record of such visits, and by memoranda indicate his judgment of the teacher's ability to teach and govern, and the condition and progress of the school, which shall be open to inspection by any school director,"² etc.

The county board of education in many States together with the county superintendent has charge of the examination of teachers for county certificates.

¹ Exceptions: Pennsylvania, township trustees elect county superintendent. New Jersey, Mississippi, Virginia, State board of education appoints county superintendent. Delaware, Florida, governor appoints county superintendent. Alabama, State superintendent appoints county superintendent. North Carolina, county board of education, clerk of supreme court, register of deeds appoint county superintendent.

² General school law of North Dakota, 1909.

In the South, where the county is the educational unit, the duties of the executive officers are quite different. The county organization of schools in Kentucky is quite typical, and is as follows: "Each and every county in this Commonwealth shall compose one school district * * * and shall be confided to the control of a county board of education. The county superintendent of schools, county judge, and county attorney of each county of the Commonwealth is hereby created a commission to divide their respective counties into four districts as nearly equal in area as is practicable. * * * Each educational district elects, at its regular November election, one member of the county board of education. These four members, together with the county superintendent, comprise the board of education, and have entire charge of the schools of the county."¹

"The township organization of schools is but a merger of districts, with practically the same rights and privileges as were invested in each of the original districts. The officers are chosen at the annual town meetings by all the electors, or, as is sometimes the case, the township is the unit of school government and the schools are made uniform throughout its extent. Maine, New Hampshire, Vermont, Massachusetts, New Jersey, and Indiana have a compulsory township organization by legislative enactment. In at least 21 other States there is permissive legislation."²

The district is the smallest unit of organization and is found in some form or other in a large number of the States. This unit grew up in New England. The Puritan's spirit of determination to provide education for his children and the inconvenience of sending pupils a long distance to school, gave us the district schoolhouse in each settlement. The families sending their children to the school constituted the school district. Its size was a matter of convenience. When the New Englanders migrated to the West they took their school unit with them, making it more definite in organization and more suitable to the land holdings in size. The district to-day is a definite division of the township and is presided over by three officers elected by the voters of the district at an annual meeting. The annual school meeting is the most perfect democracy we have, as it elects its own officers, fixes the sum of money to be raised, and votes the number of months of excess of the school year prescribed by law. The term of school office is generally three years, and the officers have power to employ teachers, handle the funds of the district, and provide for the care of all school property.

The great industrial changes in this country, the large movement of the rural population to the cities, and the settling of large numbers of the foreign immigrants in the cities, have made the district organi-

¹ General school law of Kentucky, 1908.

² History of education in the United States, Dexter.

zation in many regions unsuitable. The large number of district schools with less than ten pupils has meant great expense, poor facilities for work, and unsupervised teaching. The State superintendents are urging upon the people the reorganization of the district and the consolidation of weak districts. The township unit is probably the unit of the future. Massachusetts solved this problem as early as 1882, and the other New England States have followed her example. "The school district in all towns in the state are abolished. * * * Every town shall choose by ballot at its annual meeting a superintending school committee of three. The management of the schools and the custody and care shall devolve upon the school committee, which shall annually elect a superintendent of schools, who shall not be a member of the committee."¹ This law does not apply to towns authorized to control school matters according to special conditions as in large cities. The Maine system is quite typical of township organization derived from the district organization. "The school committee of two or more towns having under their care and custody an aggregate of not less than 20 or more than 50 schools may unite in the employment of a superintendent of schools, provided they have been so authorized by a vote of their own towns at a regular town meeting or a special town meeting organized for that purpose."²

Every State has made special laws for the organization of city schools, and in many cases special charters have been given certain cities to meet unusual conditions. The city unit is usually a collection of districts. It is governed by a board of education and a superintendent. Other than this there is little uniformity of organization. The city boards of education vary in number from 3 members to 84, but a very common number is 9. The superintendent is elected by the board of education and is its executive in all matters pertaining to the workings of the school.

B. INTERNAL ORGANIZATION OF THE ELEMENTARY SCHOOL.

The term elementary school has various meanings. In the Eastern States it refers to the first nine school years or grades; in the South it usually means seven grades; and in the North and West eight grades. These grades or years are usually divided into four primary grades and four grammar grades. There are, however, other organizations, as in Tennessee, where the grades are defined by law, as follows:

The course of study in the primary school shall consist of five grades and the course of study in the secondary school shall consist of eight grades.

¹ Laws of Maine relating to public schools, 1909.

² Report of public instruction. New Hampshire, 1908.*

* * * Pupils completing the first-year grades and attaining proficiency therein shall receive a certificate from the State superintendent certifying that the holder has completed the primary-school course, which shall be countersigned by the county superintendent and district directors and the teacher or teachers of the school, and shall entitle the holder to enter the sixth grade of the secondary school of any school district, or of the high school of any high-school district. The county high schools shall be graded by the board of education under the general regulation of the State superintendent and supervision of the county superintendent, beginning with the sixth grade, shall be adjusted for the admission of pupils who have completed the five grades of the primary schools.¹

The coordination of the elementary school with the secondary school has been perfected in many States by a county or State leaving examination. This examination is given by the county board of education and all papers are rated by the county board. The examinations are the same throughout the county. A pupil receiving an elementary-school diploma of this character is allowed to enter any high school of the State without further examination. In California the law is as follows:

The courses of study for the day elementary schools of California shall embrace eight years of instruction * * * except in city school districts having boards of education, the county or city and county board of education shall provide for the conferring of diplomas of graduation by examination upon the pupils who have satisfactorily completed the course of study provided for the day and evening schools of the country or city and country.²

The States that have provided for the coordination of the elementary school with the high have raised their rural schools to a higher plane. The teachers who do not succeed in preparing their last classes for these county examinations soon find that there are no schools needing their services. Many schools look forward to the elementary-school graduation with as much pleasure as to the high-school graduation.

Some of our best educators are recommending a six-year elementary school period, to be followed by a six-year secondary school. This plan has many arguments in its favor. The pupil at the close of the sixth grade should be between 12 and 13 years of age. Those that are under grade average about 14. The under-grade pupils are in general the ones who leave school as soon as the age limit of compulsory education is reached. Nearly all of the States make the age limit 14 years. It would be an incentive to good work and regular attendance for the pupil to feel that graduation and a diploma are within his reach. From 12 to 14 there is a marked change in the ability of pupils to think and to grasp the meaning of problems. The teacher who is a specialist in his line of work appeals to the pupil. This is shown in the marked success of the departmental plan for the grammar grades. Looking toward a six-year high school

¹ Public school law of Tennessee, 1909.

² School laws of California, 1909.

a number of our schools already have a seven-grade elementary school and a five-year high school. The Horace Mann School of New York City finds the latter an admirable scheme of organization.

C. EFFECT OF THE ABOVE UPON THE TEACHING OF ARITHMETIC.

This report is particularly interested in the effects of the organization of the schools upon the teaching of arithmetic. "There is not complete agreement among teachers as to the extent and character of the number work of the first school year."¹ All schools, rural and village, agree in general as to the amount of arithmetic to be covered in the grades, but the grade where formal arithmetic should begin, the way arithmetic should be taught to the young child, and the grade where arithmetic should be completed, are unsettled. "For the first half year the work should be mainly oral and largely incidental to other school exercises, especially to the construction work."¹

"There should be no formal number work in this grade. In connection with the general oral lessons and occupation work many facts concerning the simpler number relations are informally presented and acquired."²

"Arithmetic grows out of other school exercises and is applied in problems of construction."³

"In grade one the children repeatedly discover numerical relations through counting. In grade two numerical relations are further revealed through work with measures. Grade three is a year of drill in number facts, the teacher resorting to the use of measures only when necessary. Grades four, five, and six are drill years in the processes and operations, with an increasing amount of applied arithmetic. In grades seven and eight pupils should increase in facility through abstract drill and in power to reason through applied arithmetic."⁴

In the course of study prepared for the rural schools of Michigan the entire work of the first four grades is oral, and the work of the first two places the emphasis on sense training. In the course of study prepared for the District of Columbia the first year is given to sense training. In the schools of San Francisco all of the work of the first grade is oral. It includes counting, addition, and subtraction, with nine as the limiting number. In the training school of the Michigan State Normal College the first year of the arithmetic course is devoted to sense training. "Not to put arithmetic as a topic in the first grade is to make sure that it will not be seriously or systematically taught in nine-tenths of the schools of the country.

¹ Course of study for the common schools of Illinois, 1907.

² Course of study, Denver public schools.

³ Course of study, Cleveland public schools.

⁴ Course of study, Boston public schools.

The average teacher, not in the cities merely, but throughout the country generally, will simply touch upon it in the most perfunctory way. Whatever of scientific statistics we have show that this is true and that children so taught are not, when they enter the intermediate grades, as well prepared in arithmetic as those who have studied the subject from the first grade on.

"Furthermore, while it is true that the essential part of arithmetic can be taught in about three years, it can not for psychological reasons be as well retained if taught for only a short period. The individual needs prolonged experience with number facts to impress them thoroughly on the mind."¹

In regard to the completion of arithmetic there are three positions taken: First, that arithmetic should continue through the eight grades; second, that arithmetic should be completed in the seventh grade and algebra or geometry given in the eighth grade; and third, the simultaneous teaching of arithmetic and algebra or geometry in the eighth grade. The majority of schools teach arithmetic through the seventh and eighth grades but introduce the use of the equation in the fifth grade and give in the seventh and eighth grades some descriptive geometry in connection with mensuration. This course seems to make the necessary preparation for high school work.

D. ELEMENTARY PRIVATE SCHOOLS.

The private elementary schools are few in number. They are generally organized in connection with the private secondary schools as the elementary department. The private schools of the country are largely located in the East and South. Their purpose determines the organization and course of study. "The school aims to offer educational facilities fully abreast of the changing conditions of modern life; to retain those features of scholastic work that experience has stamped as sound and effective; to inaugurate promptly such plans as local conditions may require."² "The purpose of the school is to maintain a high order of training—mental, moral, and physical—to both boys and girls of the primary, intermediate, and high school grades."³

"The object of the school is to give thorough preparation for colleges and universities and at the same time to give instruction in those branches of an English education necessary to success in the ordinary pursuits of life."⁴

"The formation of character and not the acquisition of knowledge as an end in itself is the chief purpose of the school—a purpose

¹ David Eugene Smith: The teaching of arithmetic. Teachers College, Columbia University Press.

² Friends School, Baltimore, Md.

³ Friends School, Washington, D. C.

⁴ University School, Montgomery, Ala.

which the home and school should pursue together, in close cooperation with each other.”¹

“The title ‘University School’ partly explains itself, for the school’s first aim is to thoroughly prepare boys for college work. The second particular purpose of the school is physical and moral development in connection with mental work.”²

“The end set up is a social, an ethical one. The means taken to attain this aim are: First, the inculcation of the democratic spirit.

* * * Children of the rich and poor and of different nationalities and races are to meet together and learn to respect one another, both in their work and their play; secondly, the awakening of serious intellectual interests and enthusiasms in order to counterbalance the pleasure-loving and self-indulgent tendencies; third, the awakening of the spirit of social service by enlisting the interest of the students in the work of settlements and neighborhood houses with which the school is in touch; fourth, the building up of a largely humanitarian and ideal purpose toward which all lines converge.”³

And thus to give the aim and organization of the private school is to write all the individual means of carrying out the various aims. In general, the organization and course of study are the same as in the public elementary school. In place of emphasis each school shows its own individuality in carrying out the purpose for which it was organized. The variation in amount of arithmetic taught and time given is quite similar to that of the public school.

III. THE MATHEMATICAL CURRICULUM IN EACH TYPE OF SCHOOL.

Information concerning the course of study for the first six years of the elementary schools was obtained from the replies to a questionnaire sent to all States and leading cities and from an examination of a large number of printed courses of study.

Of the 48 States and Territories to which questionnaires were sent, 40 were heard from either directly through the State superintendent or from a representative city within the State. The eight from whom no replies came were in all cases States of small population. Of the 25 largest cities, 24 replied; of the 50 largest, 37 replied. The total number of cities heard from was 52. The total number of questionnaires sent out was 200; the number of usable replies, 90.

The replies from the leading private schools were limited and, as far as they could be interpreted, differed but little from those of the public schools. The replies from the State superintendents were inadequate owing to the impossibility of making generalizations upon the work of a State where there is of necessity, with few excep-

¹ Francis W. Parker School, Chicago, Ill.

² University School, Cleveland, Ohio.

³ Ethical Culture School, New York City.

tions, great variability in the courses of study. The most valuable replies were those from the leading cities of the country. A statistical report was therefore made from these. The 52 city school systems which formed the basis for the work represented in the aggregate 2,480,000 pupils. Every section of the country was represented, but the most densely populated States, such as New York, Pennsylvania, Ohio, and Massachusetts, were proportionately largely represented.

The questionnaire was in three sections. The first section asked for the means employed to broaden the scope of arithmetic, the second for means used to narrow the field, and the third asked for specific information as to the time the study of number was commenced and the year in which different arithmetical topics were studied.

The questions as to the means employed to broaden the scope were: (1) Are geometric forms studied? (2) Are the equation and a literal notation used in the solution of problems? (3) Is the application of number to manual training emphasized? To geography and nature study? To practical affairs? (4) What other means are used to broaden the scope of arithmetic?

In reply to the question as to the means used to broaden the scope of arithmetic through the study of geometric forms 72 per cent of the school systems replied in the affirmative, 23 per cent were in a qualified affirmative, such as "somewhat," "a little," making a total affirmative of 95 per cent and a total negative of 5 per cent. The questions on the equation and literal notation were, it was evident, understood to include seventh and eighth grades instead of the grades within the limits of the investigation. The replies, although of little value for this report, were as follows: Affirmative for the use of the equation, 51 per cent; qualified affirmative, 36 per cent; negative, 13 per cent; affirmative for the use of a literal notation, 9 per cent; qualified affirmative, 50 per cent (all labeled for seventh and eighth grades); negative, 41 per cent. In reply to the question on the application of number (1) to manual training, 50 per cent of the school systems replied in the affirmative; 35 per cent with a qualified affirmative "somewhat," making a total affirmative of 85 per cent and a negative of 15 per cent; (2) to geography and nature study, affirmative, 50 per cent; qualified affirmative, 18 per cent; total affirmative, 68 per cent; negative, 32 per cent; (3) to practical affairs, affirmative, 95 per cent; negative, 5 per cent. Typical replies to the fourth question as to other means used to broaden the scope of arithmetic were: "Our tendency is to concrete work in all grades in terms of a child's experience;" "Data for exercises taken from actual measurements and actual affairs;" "Practical affairs cover the ground;" "Arithmetic throughout is considered a social study;" "Use of actual tax bills, gas bills, water bills, etc. (forms borrowed

from public service companies); "Arithmetic not valued as formerly for its worth in discipline, but it is being made very practical;" "Connected with home life and local industries."

The questions on the means used to narrow the field were: (1) Do you have the children do more work with small numbers and less with numbers in the millions than formerly? (2) Do you teach only those arithmetic topics for which children have immediate use, excluding such topics as interest and wall papering? (3) Other tendencies?

Of the replies as to the use of smaller numbers 91 per cent were affirmative, 3 per cent qualified affirmative, making a total affirmative of 94 per cent and a negative of 6 per cent. In reply to the question on the choice of those subjects for which the children had immediate use, 44 per cent replied in the affirmative, 32 per cent gave a qualified affirmative, making a total of 76 per cent affirmative and 24 per cent negative. The replies to the third question "Other tendencies" ran as follows: "Toward simplification," "Our tendency is toward the elimination of topics not clearly serviceable," "We emphasize mental and oral work with small numbers to secure facility in common processes," "Insistence upon simple problems and proficiency within narrow limits," "Toward simplification, accuracy; certainty," "Much work with small numbers; simplified problems," "The elimination of topics; emphasis on mental work."

In the third section of the questionnaire the following questions were asked: In what year is the study of arithmetic commenced? The four fundamental processes completed? The study of fractions commenced? The study of fractions emphasized? Ratio studied? Percentage commenced?

The replies answering these specific questions as to the order of work were as follows: Number was recorded as commenced in first grade in $71\frac{1}{2}$ per cent of the school systems replying; in second grade in 22 per cent of the schools and in third grade in $6\frac{1}{2}$ per cent. The four fundamental processes were reported as completed in the third grade in 5 per cent of the schools replying; in fourth grade in 78 per cent of the schools; and in fifth grade in 17 per cent. Fractions were commenced in the first grade in 14 per cent of the schools replying, in second grade in 21 per cent, in third grade in 17 per cent, in fourth grade in 21 per cent, and in fifth grade in 27 per cent. Fractions were emphasized in the third grade in 2 per cent of the schools replying, in fourth grade in 10 per cent of the schools, in fifth grade in 63 per cent, in sixth grade in 23 per cent, in seventh grade in 2 per cent. Ratio was studied somewhere in the lower grades as a basis for later work in 40 per cent of the schools, in the middle grades (fourth, fifth, and sixth) in 30 per cent of schools and left entirely for upper grades (seventh, eighth, and ninth) in 30 per cent

of the schools. Percentage was commenced in the fourth grade in 5 per cent of the schools, in fifth grade in 30 per cent of the schools, in sixth grade in 45 per cent, and in seventh grade in 20 per cent.

It is difficult to get at the real truth in any situation through a system of questions and answers for the reason that almost any question which can be formulated admits of misinterpretation. By comparison of the replies to the questionnaire with the printed courses of study it was found that the greatest liability to misinterpretation lay in the first section of the questionnaire, which refers to the means used to broaden the scope of arithmetic. The replies throughout the section included in many cases the seventh and eighth years of the elementary school. This makes it necessary to interpret not only the answers in the equation and literal notation in a different way from which the replies indicated (attention has already been called to this), but the answers also on the application of arithmetic to manual training, geography, and nature study. In the second section of the questionnaire there was no difficulty. In the third section there was some difference in the interpretation of the question on the year in which number was commenced. In several schools where number was introduced incidentally in the first grade it was sometimes recorded as commenced there and sometimes not. The report, therefore, gives an idea of an earlier commencement of the formal study of arithmetic than actually exists. There was a similar confusion between incidental and formal work in fractions and ratio. Much incidental work in fractions is done in the first three years, but the study of a fraction as a fraction is left in the majority of cases to the fourth and fifth years. Ratio forms the basis of several special methods of teaching number used in many localities throughout the country. In such cases it is recorded as studied in the primary grades. Ratio and proportion as such are usually put down in the printed courses of study as work for the seventh and eighth years.

The summary is indicative of an advance in the work in general. One step forward is the tendency to broaden the scope of arithmetic so that it is less a series of exercises for the manipulation of figures and more of an introduction to mathematics in general. If we may take the summary as typical of the state of affairs, the study of geometric forms is becoming current, and in the seventh and eighth grades the use of the equation and of literal notation is making some headway. It is possibly wise that the latter are not used below these years, owing to the fact that the substitution of a formal means of solving a problem for a child's own natural logic is likely to cause confusion in his mind. The tendency to correlate arithmetic with other subjects and make it a thoroughly practical subject is strong. An equally striking demand throughout the country is the cry for the simplification of arithmetic through the use of smaller

numbers, the elimination of topics, the simplification of problems, and an emphasis on mental rather than written work. The tendency is to limit the work to what comes within the child's experience and expect greater efficiency within the narrower field. As to the program of work there is a tendency to begin number somewhat later in the primary school than formerly; to devote the years before the fifth grade to the four fundamental processes with integers, the fifth year to fractions, and the sixth year to fractions and percentage.

Since the cities as a usual thing are in advance of the smaller communities and the rural districts and serve, more or less as their leaders, the summary is more indicative of the trend of the courses of study than of the state of things as they actually exist. It shows a more advanced state of affairs than would be found extant if an average could be made of the work of the country as an entirety.

IV. THE QUESTION OF EXAMINATIONS FROM THE POINT OF VIEW OF THE SCHOOL.

The specific purpose of this section is to treat the question of examinations from the point of view of the school in its present status and as to its present tendencies.

The main sources of data on which this report is based are: (1) the returns from the questionnaire, formulated in conjunction with the subcommittee on the nature of promotion in elementary schools and admission to secondary schools, and sent out by the United States Commissioner of Education, and (2) the subcommittee's knowledge of the uses being made of "standardized tests."

Of the 1,000 questionnaires returned, 427 were fully tabulated. These were the first received and are believed to be representative.

The subject as assigned placed the emphasis on examinations as used and viewed by immediate school workers rather than by superintendents or examining boards. Hence the superintendents were requested to have the questions answered by their principals. This was done so as to make the replies represent more fully "the point of view of the school." Answers from teachers would have represented this point of view still more fully, but the securing and handling of a sufficient number to be representative of the entire country seemed impracticable.

Conclusions based on returns from questionnaires must always be made guardedly. Caution is especially necessary in dealing with these returns because of the unavoidable vagueness and overlapping of some of the answers. However, the tabulated answers seem to warrant the following conclusions:

1. The use of examinations is very general, practically universal. They are made use of to some extent in all grades above the second; 102 of the 427 schools report their use in the second grade; twice as

many in the third; and in the fourth, fifth, and sixth grades practically all report them.

2. In this very general use of examinations the point of view of the school is commonly recognized. This is clearly shown in the answers to the question, By whom are the questions made out? Only 106 of the 427 reports show the superintendent making examination questions independently; 220 show the teachers and superintendents or supervisors in cooperation; 203 show the teacher making questions independently; only 48 principals are reported as making the questions; and in only 22 answers were there any State or county questions reported.

3. There is no agreement as to the frequency of giving examinations. One hundred and forty-two say every month or less; 124 irregularly; 55 bimonthly; 48 quarterly; 180 twice per year; and only 19 annually. One conclusion seems safe, viz., that the practice of giving "finals" at the end of the year is decidedly uncommon. However, the 180 giving them twice a year may indicate some additional use as "term end" finals.

4. The use of examinations seems to be decreasing somewhat. Two hundred and fifty-six say it is decreasing, while 110 say increasing; 97 report no change; 57 do not know; and 19 say that the nature of examinations is changing.

5. The purposes for which examinations are given are not clearly indicated. There were only 99 of the 427 that gave "aid in determining promotion or giving marks" as a purpose, while 181 gave the answer, "to help the teacher judge the efficiency of her teaching;" and 390 "to test the knowledge or power of the pupils." While the vagueness of the last answer makes it susceptible to several interpretations, taking the 390 with the 181, it is probably safe to infer that the largest single purpose of examinations is to measure progress of pupils.

6. There seems to be a clearly voiced desire for "standardized tests;" 289 of the 427 answered "Yes" to the question, "Do you believe that there is any increasing desire for standardized tests?" and 73 said that such tests would be desirable if available; only 92 answered "No" and 22 "Not desirable." Those who understand the idea of such tests are enthusiastic in their approval.

The questionnaire answers gave evidence that standardized tests are not widely known; that they are comparatively little used; but that there is a present tendency to do so, since several representative schools are making use of tests recently published in book form.¹ These tests are standardized in that, under identical circumstances, they have been used to measure the abilities of pupils in the second

¹ Arithmetical Abilities, by C. W. Stone, Teachers College Bureau of Publications, Columbia University.

half of the sixth school year in representative systems of schools; and in that the respective achievements of these pupils are given in the book. By using these tests as directed anyone can determine where his pupils stand in the essentials of arithmetic as compared with the pupils of some of the best systems in the United States.

Accounts of four of the uses of these standardized tests have recently been published. The most recent of these articles is by Mr. J. C. Brown, of the Horace Mann High School, New York City, who used the "fundamental" test as a basis for determining the value of drill.¹

Another recent investigation in which the tests were used was made by Prof. W. S. Smiley at the State University of Iowa. Prof. Smiley measured and compared the arithmetical abilities of one room of rural school pupils and graded town school pupils.²

Messrs. Birkhead and Somers, principals of schools at Louisa, Va., and Red Hill, Va., respectively, used the tests to measure arithmetical abilities in six representative public schools of Virginia.³

The most extensive study utilizing these tests is that made by Mr. S. A. Courtis, of the Detroit Home and Day School, a private school for girls in Detroit, Mich. Mr. Courtis is using the tests as a means of determining the effects of certain changes in the teaching of the mathematics for which he is responsible. Mr. Courtis has written a number of articles on the subject; he says in conclusion:

More than all else, it has proved conclusively to the writer at least, that it is practicable to measure not only the general condition of arithmetic teaching throughout a school, the growth in ability and efficiency from grade to grade, the defects and needs of any one grade or individual, but the effects of changes in method or procedure as well.⁴

The value of standardized tests has appealed so strongly to Mr. Courtis that he has recently published a set that are by far the best extant;⁵ and mathematics teaching will doubtless receive even greater help from him in the near future.

Another use of these tests may be illustrated by tests recently given to determine the effects of changes in teaching. When tested in 1907 the pupils of a certain school made a score of 468 points per 100 pupils in reasoning, and 2,311 points per 100 pupils in fundamentals. In 1910 the pupils of this same system made a score of 607 in reasoning, a gain of 139, and a score of 2,833 in fundamentals, a gain of 522.

¹ An investigation of the value of drill work in the fundamental operations. *Journal of Educational Psychology*, February, 1911.

² A comparative study of the results obtained in instruction in the "single teacher" rural schools and the graded town schools. *Elementary School Teacher* (University of Chicago Press), January, 1911.

³ How do our Virginia schools stand in arithmetic? *Virginia Journal of education* (Richmond, Va.), March, 1910.

⁴ *Elementary School Teacher*, October and December, 1909, and December, 1910.

⁵ The Courtis standard tests in arithmetic with manual of instructions for giving and scoring. S. A. Courtis, 441 John R. Street, Detroit, Mich.

Thus the use of these tests indicate that in this school the present teaching of arithmetic produces considerable more ability in the essentials than did the teaching of 1907.

Another purpose for which these tests are being given is to measure the effect of such radical changes in administration as omitting all arithmetic work from grades one and two. This experiment has been tried in several cities in New England, in a few on the Pacific coast, and in one in the Middle West.

The question that immediately arises is, How well do children learn arithmetic without its being taught during the first two grades? This question is being answered by measuring the abilities of children so taught and comparing them with the achievements of children who have had arithmetic teaching during the first two grades. In one of the above-mentioned systems the last class of pupils in the second half of the sixth grade, who had had arithmetic teaching in grades one and two, were measured. During the present school year the first class of pupils who have not had arithmetic teaching in grades one and two will reach the second half of the sixth grade. The abilities of this class will be measured and the results of measuring these two sets of pupils from the same system, together with the results from the original twenty-six systems, will constitute the basis of a comparative study which may yield objective data for answering questions concerning the advisability of omitting arithmetic teaching from the first two grades.¹

The question of examinations from the point of view of the school may be summarized as follows:

1. Examinations are used in some form in some grades in practically all schools.
2. The point of view of the school is largely recognized.
3. As to the purpose of examinations and their frequency there is no agreement.
4. Their use is probably decreasing, especially the use of "finals," as the main basis of promotions.
5. There is increasing desire for "standardized tests."
6. These tests are beginning to be used to measure the relation between the theories and products of arithmetic teaching; and as a means of securing data from which the best procedures can be determined.

¹ Of course, the danger of fallacy here is evident. The abolition of arithmetic in grades one and two may have been accompanied by more enthusiastic and skillful teaching after the second grade, or by even a greater amount of time being devoted to the subject, so the results of such a comparison must be guarded by checks.

V. THE METHODS EMPLOYED IN TEACHING ELEMENTARY MATHEMATICS.¹

I. SCOPE OF THE STUDY.

It is the function of this study to convey some notion of the methods employed in teaching mathematics in the first six grades of the American elementary school. No attempt is made to give a minute description of the endless details of teaching procedure, nor even to enumerate all the types of teaching method employed. Its purpose is restricted to an analysis of the larger tendencies in teaching practice which are representative of the spirit of mathematical instruction in the lower schools.

Owing to the existing confusions, it is well at the very outset to have in mind a clear definition of the term "teaching methods." Teaching methods are always methods of presentation. In this respect the teaching art is like any other art, literary, graphic, plastic, or what not. The literary artist, for example, has a purpose, a subject matter, a particular audience, and a special style of presentation. All these factors are present in the teaching art. The aims of instruction, the particular facts to be taught, the immaturity of the child taught, and the inevitable personality of the teacher determine the style of instruction, or, to use our own "trade word," a method of teaching. Every teacher, then, has a style or method—conscious or unconscious, good, bad, or indifferent. Unlike the literary artist, he has many ends to serve rather than one. His functions are general to life, and include moral, social, and personal ends, as well as those that are æsthetic. His methods of communication, too, are more than one. He presents his experiences objectively and graphically, as well as through the medium of written words and speech. Always the teacher's end is to stimulate growth through the presentation of experiences. When that presentation of experience takes a form and order different from that usual to adult life for the precise purpose of making the fact more readily comprehensible by the immature mind of the child, then that modification may be called a method of teaching. Teaching methods are always special manners of readjusting adult wisdom to the special psychological conditions of a student's mind.

In the concrete, methods of teaching would always represent something particular to a situation, and as variable as situations are variable. Life is never just the same at any point. Yet certain essential similarities exist and give us the opportunity to interpret life in terms of law. The same may be said of the teaching life. In a

¹This part of the report was prepared by Prof. Henry Suzzallo, Teachers College, Columbia University, New York City. In more extended form it appeared in the Teachers College Record for March, 1911.

sense it never repeats itself, yet to the degree that the same end, the same subject matter, and the same immaturity of mind recur in classrooms, teachers will tend to use similar modes of adjustment. In describing mathematical teaching in the primary schools, it is these similar modes of teaching adjustment, these similar "general methods" that we shall describe and analyze.

It will be unnecessary to have a separate treatment of the "general methods" of mathematical teaching for public schools and private schools. Whatever may be said of the State-supported schools will in general be true of private institutions. It is true of elementary schools, as it is not of secondary and higher schools, that private institutions hold a relatively minor place, as compared with public or State schools. They are in a sense mere adjuncts to the public-school system, claiming, in the generality of cases, no real difference in their ideals and methods of instruction.

It will perhaps simplify the task of this study and make its treatment more thoroughly representative of all conditions, if the general methods described be restricted to that field which is most characteristic of the first five or six years of mathematical instruction, namely, to the teaching of the fundamental processes of manipulating integers and fractions along with their simple applications to concrete problems.

While the aspects of mathematical instruction here studied and presented are selected because of their representative nature, it would be unwise to restrict ourselves to a statement of the commonly accepted procedures of schoolroom practice. There are in America certain reform tendencies which are as characteristic of conditions as are the conservative practices. These modifying forces need to be mentioned along with the practices that they alter. Again, there are certain scientific efforts, now well underway, to study the problem of methods in teaching. While these have, as their immediate aim, the acquisition of new knowledge rather than direct educational reform, their ultimate effect will be to change methods of teaching. For this reason they are important, and have a proper place in this presentation.

II. THE INFLUENCE OF AIMS ON TEACHING.

The purposes of mathematical instruction in the elementary school must always be very influential upon method. It makes a great difference whether one is merely teaching the elements of mathematics or is teaching mathematics as a tool for business life.

THE INFLUENCE OF A SCIENTIFIC AIM.

It has not been long since the aim of mathematical teaching was merely scientific. The facts taught were the beginning of a science,

and the end was to obtain a foundation for more advanced facts of the same kind which were dependent upon this foundation. As the teacher had learned his mathematics, so he taught the subject. To a considerable degree as the master's adult mind classified the facts of the subject, so he presented it to the child. His methods were logical rather than psychological. He gave the finished product or process to the child without special modification because the child was immature; a roundabout method that slowly approximated and only finally achieved the full result was with such a teacher exceptional.

Such a scientific aim, implicit rather than expressed, dominated the methods of teaching when arithmetic was handed over to the elementary schools by the higher institutions of education. As the first purpose to be rooted in the traditions of mathematical teaching it still persists with all the rigidity of a conservative force. Teachers still tend to teach future workmen in the lower schools as they themselves were taught by scientific scholars in the universities. And high school and college instructors still impose their standards upon the lower schools so as to influence their methods of instruction. As the purposes of higher instruction still remain largely scientific in purpose and method they give aid to the persistence of an original tradition in the elementary schools. Under such an influence the worth of a mathematical fact is measured by its place in a logical scheme, rather than by its significance and recurrence in everyday life. The mathematician may need to know all about the names of the places in notation and numeration; the layman cares only about the accurate reading and writing of numbers, and not at all about the verbal title of "units of thousands" place. Again, the rational needs of a thinker about mathematics may require an understanding of the reasons why we "carry" in column addition, but the effective everyday use demands an accurate habit of "carrying" rather than an accurate explanation. Yet just such methods persist in our schools because of the domination of a scientific treatment of the subject.

The remoteness of such mathematical teaching from the needs of common life constantly threatens the loyalty and support of the public. Some defense becomes necessary on other than scientific grounds. Such a sanction could not be found in utilitarianism, for the waste was evident. It remained for a psychological theory to sketch a defense upon "disciplinary" grounds. The doctrine of "formal discipline" says that such mathematical teaching trains the powers of the mind so that any mastery gained in mathematics is a mastery operating in full elsewhere, regardless of the remoteness of the new situations from those in connection with which the power or ability was originally acquired.

The effect of such doctrine is to defend and perpetuate every obsolete, unimportant, and wasteful practice in the teaching of mathematics. No matter that partnership as taught in the schools had its original sanction in its close correspondence to the reality of business practice; no matter that the old sanction had passed; teach it now for its ability to discipline the mind. This questionable psychological doctrine, said in consequence, "Whatever is, is right!" No matter that "life insurance" touches more men than "cube root"; the latter should be kept because of its power to train the mind. In life, where "approximation" of amounts suffices, the teacher demands absolute accuracy, and the ethical worth of such precise truth is the high law for its defense. Regardless of the truth that is concealed in the doctrine of "formal discipline," it must be confessed by those who know the history of teaching methods in the United States that it is the main defense of conservatism and the largest cause of waste in teaching methods.

Such has been the ground upon which recent educational reform has operated. Slowly the older scientific and disciplinary aims of instruction have given way to the newer purposes of business utility and social insight. In that step a large transition was covered. Before the school had measured the worth of its work by standards internal to educational institutions, the schoolmaster and the scholar, rather than the man on the street, had formulated the scientific classifications of mathematics and expounded the doctrine of formal discipline. Hereafter the measure of efficient school instruction is a reference to standards external to the school, the product of conditions outside of school life. Business need and social situation determine if a fact or process is worth comprehending, and whether the method of instruction has been effective.

Business utility, coming at a time when the elementary-school course was felt to be overcrowded, met with a ready reception. It operated for the time being as the standard by which materials and methods in arithmetic are to be eliminated, if not actually selected. Materials not general to the business world, such as the table of troy weight, were therefore eliminated. Processes of computing interest infrequently used were supplemented by more widespread and up-to-date methods. More doing and less explaining characterized the instruction in adding columns of figures, and such manipulation mimicked the exact conditions of its use in the world at large. If strings of figures are usually added in vertical columns in the business world, then they should be taught in vertical columns more nearly exclusively than before. The obsolete and the relatively infrequent, the over-complex and the wasteful processes of the old arithmetic tended to disappear. More than any other influence this aim of business utility has combated the overconservative influence

of scientific and disciplinary aims which dominated previous decades. The newer methods of teaching have kept the best of the old movements. The work is still scientific in that it is accurate; it is still disciplinary in that it trains; but the truth and the training which are given are selected by and associated with actual business situations common to everyday life.

There is evidence in the present thought of teachers that a broader utility than that of the business world is beginning to obtain in the schools. The general increase in the social consciousness of the teacher is reflected in mathematical instruction. Everywhere in these days the American teacher and the educational writer speak of the social aims of education. The influence of the social aim of instruction upon mathematical instruction is subtle but obvious. The business man's opinion with reference to arithmetical instruction is not always taken as gospel. There are other standards. "Why," says the schoolmaster, "should I train people for your special needs, any more than for the demands of other trades that men ply? To be sure, our graduates do not fit perfectly into your shop at once. But that precise and local adjustment is the work of the business course or of shop apprenticeship. My function is to train men for the situation common to all men and special to no class. The elementary school is a school for general culture or social appreciation, not a business college or a trade school." The sociologist usurps the place of the business man as the school's proper critic.

The situation to-day as influenced by existing aims is one of transition in which old and new purposes mingle with unequal force in giving us a mixed process of instructing American youth in arithmetic. Old materials and methods still persist, for logical and disciplinary ideals still hold; but the newer regimen ushered in by the demands of business utility and social understanding gains ground. The obsolete, the untrue, the wasteful methods pass from arithmetic teaching, and the pressing, modern, and useful activities and understandings enter. Arithmetic is less abstract and formal as a subject than it was; it has become increasingly vital and concrete with real interests, insights, and situations. The grind of sheer mechanical drill decreases in its teaching, and a reasoned understanding of relations, in some degree, at least, is substituted. Artificial motives and incentives are less frequently used to get work done, and the appeal of live institutions for a quantitative solution and understanding increasingly asserts itself.

III. THE EFFECT OF THE CHANGING STATUS OF TEACHING METHOD.

Teaching method in the school is primarily a readjustment of forms of knowledge and experience so as more effectively to stimulate and improve the immature responses of children. Two important

movements have been responsible for the development of special methods of teaching during the past few decades—one is humanitarian and the other scientific. On the one hand, there has been a growth in reverence and sympathy for childhood. As yet it has scarcely expressed itself with fullness. The wide acceptance of the “doctrine of interest” in teaching; the enrichment of the curriculum; specialized schools for truants and defectives; individual instruction—these are the schoolmaster’s recognition of the modern attitude toward childhood. Under such conditions teaching becomes less and less a ruthless external imposition of adult views, and more a means of sympathetic ministry to those inner needs of child life which make for desirable qualities of character. While it is true that teaching method is a condescension to childhood, it is a socially profitable condescension in that it is a guarantee of more effective and enduring mastery of the life that is revealed at school. Since the child’s acquisition tends the more to be part and parcel of his own life under such sympathetic teaching, the products of such instruction are enduring.

Such a humanitarian movement naturally called for knowledge of the child. The wisdom of common sense soon exhausts itself and more scientific data is demanded. Thus the “child study movement” came into existence. Since then, a saner psychological foundation has been laid for educational procedure, one which is criticising and reconstructing teaching method at every turn. Hitherto teaching methods had been improved fitfully through a crude empiricism. Now a body of general psychological knowledge, rich in its criticism of old methods and in its suggestion of new means of procedure, gives a scientific basis to teaching method.

The public elementary school teacher is conservative indeed who will deny that there is anything worthy in the notion of “method!” As a class, teachers have faith in the special professional technique which is included under the term. They are critical of the many abuses which have been committed in the name of method. Method can not be a substitute for scholarship. It can not be a “cut-and-dried” procedure indiscriminately or uniformly applied to classroom instruction. Like every other technical means, teaching method is subject to its own limitations and strengthens a fad which the average teacher recognizes.

In spite of the fact that the majority of elementary teachers keep reasonably sane on the problem of method in teaching, it must be admitted that a considerable proportion of teachers are inclined to be attracted by systems of method that greatly overemphasize a single element of procedure. The hold which the “Grube method” with its unnatural logical thoroughness and progression gained in this country two or three decades ago is scarcely explicable to-day.

Scarcely less baffling is the very large appeal made by a series of textbooks which laid the stress upon the acquisition of arithmetic through the idea of ratio and by means of measuring. Manual work as the source of arithmetical experiences is another special emphasis, which, like the others, has had its enthusiastic adherents. Again, it is "arithmetic without a pencil" or some other overextension of a legitimate local method into a "panacea" or "cure-all" which confronts us. The promulgation and acceptance of such unversatile and one-sided systems of teaching method are indicative of two defects in the professional equipment of teachers: (1) The lack of a clear, scientific notion as to the nature and function of teaching method, and (2) a lack of psychological insight into the varied nature of classroom situations. Untrained teachers we still have among us, and others, too, to whom a little knowledge is a dangerous thing. These are frequently carried away by the enthusiastic appeals of the reformer with a system far too simple to meet the complex needs of human nature. Our experiences seem to have sobered us somewhat, the increase of supervision has made responsible officers cautious, and increased professional intelligence has put a wholesome damper upon naïve and futile proposals to make teaching easy.

A more serious evil than that just mentioned is the tendency of the supervising staff to overprescribe specific methods for classroom teachers. Recently there has developed, more particularly in large city systems, a tendency to demand a uniform mode of teaching the same school subject throughout the city. This has been brought about by the prevalent tendencies of large school systems to centralize their authority and demand uniformity of procedure. The prime causes of this tendency are to be found (1) in the specialization of grade teaching, and the interdependence of one teacher on another; (2) in the mobility of the school population which involves considerable lost energy if teachers do not operate along similar lines.

The result of such imposed uniformity is a reduction of spontaneity in teaching. The process of instruction proceeds in a more or less mechanical fashion, the teacher working for bulk results by a persistent and general application of the methods laid down. That teaching, which at every moment tends to adjust itself skillfully to the changes of human doubt and interest, difficulty and success, discouragement and insight, now taking care of a whole group at once, now aiding an individual straggler, now resolutely following a prescribed lead, now pursuing a line of least resistance previously unsuspected, can not thrive under such conditions. It stifles teaching as a fine art and makes of it a mechanical business. Under these conditions only those activities which fit the machine routine can go on. Thus it happens that we memorize, cram, drill, and review, and soon the subtler processes of thinking and evaluating, which are the best fruit of education, cease to exist.

Fortunately the one-method system of teaching will soon belong to the past, and the imposition of uniform methods is beginning to lose ground even in our cities. For the most part, the common sense of teachers and the positive statements of our better theorists keep teaching methods in a position of useful status. Teaching methods should be infinitely variable as the conditions calling for their use are endlessly changeable. Not one method but many are necessary, for their function is supplementary rather than compute. No one method should be used with a preestablished rigidity; each must be flexible in its uses, so as to accomplish the varied work to be done. The teacher directly facing the intellectual and emotional crises of childhood is the best interpreter of conditions and the best chooser of the tools of workmanship. The supervisor may advise and may point out certain fundamental laws of growth and procedure; but the concrete method which is the application of these must be of the teacher's making.

Arithmetical teaching, like the instruction in other subjects, has suffered from these widespread ventures of teaching method. In this respect it has shared the common professional lot. But in addition it has had special difficulties and adventures of its own. We have now to note those special phases of teaching method which are peculiar and local to mathematical instruction.

IV. METHOD AS AFFECTED BY THE DISTRIBUTION AND ARRANGEMENT OF ARITHMETICAL WORK.

THE TENDENCY TOWARD SHORTENING THE TIME DISTRIBUTION.

Several decades ago arithmetic, as a formal subject, was begun in the first school year and continued throughout the grades to the last school year. This is no longer a characteristic condition, much less a uniform one. There have been forces operating to complete the subject of arithmetic prior to the eighth year, and to delay its first systematic presentation in the primary grades for a period varying from six months to two years.

The attempt to shorten the period of formal instruction in arithmetic has had its effects upon the methods of teaching as well as upon the arrangement of the course of study. The presence of a large number of children who leave school by the seventh year, the example of a varied European practice, the overcrowded curriculum—all these have combined to suggest a shortened treatment of arithmetic. Hence economy, through the elimination of obsolete and unimportant topics in the course of study and through better methods of instruction, has become a pressing matter. Its influence on method is obvious.

It has focused attention upon "teaching method" and given it an increasing importance in the eyes of mathematical teachers. Specifi-

cally, it has tended to reduce the amount of objective work, to eliminate the explanation or rationalization of processes which in life are done automatically; it has made teachers satisfied with teaching one manner of solution where before two or three were given; it has laid the emphasis upon utilizing old knowledge in new places, rather than on acquiring new means.

The by-product of this belief is that any arithmetic taught during these first few years should be taught "incidentally," as a chance accompaniment of their other studies. Only after one or two years of incidental work should the formal arithmetic instruction be given. This "incidental" method of teaching beginners is difficult to estimate. It has been so variously treated that a comparative measure of its worth is difficult to obtain. The contention that children who are taught incidentally for two years and systematically for two years more have at the end of four years of school life as good a command of arithmetic as those who have had a systematic course through four school years is difficult to substantiate or deny on scientific grounds. Sometimes "incidental" teaching required by the course of study becomes "systematic" in the hands of the teacher. Sometimes the two years of "systematic" teaching that follows the incidental teaching means more than two years, since the teachers, in order to catch up, give more time and emphasis to the subjects than the relative time allotment of any general schedule would seem to warrant. Such have been the facts frequently revealed by a classroom inspection that penetrates beyond the course of study, the time schedule, and the regulations of the school board.

In the lack of specific comparative measures of the worth of such methods of instruction, there is a growing conviction (1) that beginning school children are mature enough for the systematic study of all the arithmetic that the modern course of study would assign to these grades; (2) that considering the quantity and quality of their experiences they can think or reason quite as well as memorize; and (3) that what the school requires of the child can be better done in a responsible, systematic manner than by any haphazard system of incidental instruction.

These reactionary attitudes by no means imply a return to systematic teaching of arithmetic in the first two school years, nor to such formal methods as had previously been employed. Other grounds forbid. The crude, uninteresting memoriter methods of the past have gone for good. Objective work, plays, games, manual activities make arithmetical study easier and more efficient. Indeed, these newer methods have been a large factor in convincing teachers that children have the ability to master the first steps in arithmetic during the first two years.

There are other problems of method that are not so much concerned with the beginning of the study of arithmetic, or with the span of school life that the subject is supposed to cover. These deal with the arrangement of subtopics, within the course of study, or with the manner of progression from one aspect of arithmetical experience to another.

The methods that have been employed in the United States for the arrangement or ordering of topics within the course of study have varied considerably from time to time, but all these variations may be grouped around two types: (1) The "logical" types of arrangement and (2) the "psychological" types of arrangement. If the course of study proceeds primarily by units that are characteristic of the mathematics of a mature adult mind, the type may be said to be "logical." If the course of study proceeds primarily by units that are characteristic of the manner in which an immature child's mind approaches the subject, then the type may be said to be "psychological."

The older "logical" plans are thorough and definite in their demands; the teacher always knows just what he is about. But such a system of procedure is unnatural and remote from the child; it lacks appeal and motive. The child pursues the subject as a task laid down for him, not as an answer to his own curiosities or necessities. The newer psychological plans meet the different levels of child maturity effectively; they are nearer the natural order of acquiring knowledge. But it is not easy for the teachers to keep account of the work of their own, previous, or subsequent grades. Nor does the supervising official find it easy to locate responsibility for definite arithmetical subtopics. As an order of teaching it is psychologically natural but administratively ineffective.

The result is that to-day the two types of arrangement are modifying each other and giving a mixed method, partly logical and partly psychological. That line of least resistance in which the children study arithmetical facts and processes with greatest success is modified by definite demands that topics, e. g., addition, be mastered thoroughly "then and there." The method is partly "topical" and partly "spiral." The child in the second grade may have a little of all the fundamental processes, a few simple fractions, and United States money, but just there he will be held definitely responsible for a very considerable number of the addition combinations. The pupil may have had fractions in every grade, but the fifth grade will be responsible for a thorough and systematic mastery of the same. Such is the mixed method of arrangement which is to-day prevalent in American schools.

V. OBJECTIVE TEACHING.

The use of objects in teaching arithmetic is current in the elementary school. Particularly is this true in the lowest grades of the school, in primary work. It may be said that there is a very large quantity of objective teaching in the first year of school and that it decreases more or less gradually as the higher grades are approached. By the time the highest grammar grades are reached the use of objects has reached its minimum, the underlying assumption being that the use of objects has a teaching value that decreases as the maturity of the pupils increases. Current practice does not proceed far beyond the application of the simple and somewhat crude psychological statement that the youngest children must have much objective teaching, the older less, the oldest least of all.

Reform in the direction of a more refined and exact use of object teaching has already suggested itself in the treatment of fractions and mensuration, where, regardless of the increased maturity of the children studying these topics, a large amount of objective method is utilized. This is a considerable departure from the slight objective treatment of other arithmetical topics taught in the same grades. Such exceptional practices suggest that the novelty of an arithmetical topic is the condition calling for objective work in instruction. It is immaturity in a special subject or situation which determines the amount of basal objective work. The correlation is not with the age of the pupil but with his experience with the special problem or subject in hand. It is, of course, true that the less experienced the student is the greater the likelihood that any subject presented will be novel and strange. Only in this indirect manner does the novelty of subject matter coincide with mere youth as an essential principle in determining the need of objective presentation. The naïve assumption of the older enthusiastic reformers that objective work is a good thing psychologically, one of which the pupil can not have too much, is by no means the accepted view of the new reformer. With the latter, objective presentation is an excellent method at a given stage of immaturity in the special topic involved, but it may be uneconomical, even an obstacle to efficiency, if pushed beyond.

There is then a certain coincidence of the scientific criticism of the psychologist and of the common-sense criticism of the conservative teachers who look suspiciously upon a highly extended object teaching. The teachers, on grounds of experience, say that too much objective teaching is confusing and delays teaching. The psychological critics say it is unnecessary and wasteful. The result is that, in these later days, the distribution of objective work has changed somewhat. More subjects are developed in the higher grades through objective instruction than before. Perhaps no fewer subjects

in the lower grades are presented objectively, but the extent of objective treatment of each of these has undergone considerable curtailment.

The existing defects in objective teaching are not restricted to a false placing or distribution. The quality of teaching with the aid of objects is likewise open to serious criticism. Object teaching is a device, so successful as against prior nonobjective teaching that it has come to be a standard of instruction as well as a means. As long as objects—any convenient objects—are used, the teaching is regarded as good. Given such a sanction, the inevitable result is an indiscriminating use of objects. The process of objectifying tends not to be regulated by the needs of the child's thinking life; it is determined by the enthusiasm of the teacher and materials convenient for school use.

The first fact which asserts itself in observing objective teaching is the artificiality of the materials employed. Primary children count, add, etc., with things they will never be concerned with in life. Lentils, sticks, tablets and the like are the stock objective stuff of the schools, and to a considerable degree this will always be the case. Cheap and convenient material suitable for individual manipulation on the top of a school desk is not plentiful. But instances where better and more normal material has been used are frequent enough in the better schools to warrant the belief that more could be done in this direction in the average classroom. The "playing at store", the use of actual applications of the tables of weight and measures are cases that might be cited.

The materials used are not only more artificial than they need be, but they are too restricted in range. More forms of even the artificial material should be used, thus minimizing the danger of monotony.

Even the narrow range of materials in general use might be better employed than it is. There is, of course, a distinct tendency to vary the objects, merely because a child gets tired of it as a material. It is too frequently the case that the teacher will treat the fundamental addition combinations with one set of objects, e. g., lentils. In all the child's objective experience within that field there are two persistent associations—"lentils" and "the relation of addition." The accidental element has been emphasized as frequently as the essential one, and being concrete has had even a better chance to impress itself.

The nature of the materials proper to objective teaching has likewise been too narrowly interpreted. Objective teaching has meant almost exclusively instructing or developing through three-dimensional representation, whereas another form has been neglected, which for all the psychological purposes of education has as much worth as so-called objects, namely, use of such material as pictures. Such quasi-objective material has been little used by teachers save as it

appears in textbooks. There are, of course, obvious disadvantages to pictures and diagrams. The things represented in and by them are not capable of personal manipulation by the child in the ordinary sense. But they have a superiority all their own. They offer a wider, more natural, and more interesting range of concrete experiences.

There are other curious phases of narrowness in the current pedagogical interpretation as to what constitutes a concrete or objective experience. It will be noted that visual objects are the ones generally employed and that they are generally inanimate objects. Of late there has been some tendency to use hearing and touch in giving a concrete basis to teaching. Advantage is taken of the social plays of children and their games with things. Here the children themselves and their relations and acts are the experiences from which the numerical units are obtained. With some of the best teachers in the lowest grades it is no longer unusual to see children moving about in all sorts of play designed to add reality to and increase interest in number facts.

Inductive teaching has been one of several movements affecting objective teaching. The effort of teachers to escape the slavishness of mere memoriter methods and to approximate real thinking led to the introduction of inductive teaching. Necessarily objective teaching became more or less identified with the new movement and was influenced by it. So, it has been said of objective work in arithmetic, as it has been said of laboratory work in the sciences, that such instruction is a method of "discovery" or "rediscovery." Such an alliance has had its beneficial effects upon objective teaching; it has redeemed it from the aimless "observational work" of an earlier "objective study." But in the teaching of arithmetic, at any rate, it confused an objective mode of presentation with a scientific method of learning truth, two activities having a common logical basis, but not at all the same. Under the assumption that the developmental method is one of rediscovery, the tendency is to give the child as complete a range of concrete evidences as would be necessary on the part of the scientist in substantiating a new fact. The result is, that long after the child is convinced of the truth, say that 4 and 2 are 6, the teacher persists in giving further objective illustrations of the fact. The child loses interest in the somewhat monotonous continuance of objective manipulations, and the teacher has naturally wasted time and energy.

Another modern movement in teaching method which has had a conspicuous effect on objective teaching is the movement toward "self-activity" on the part of the child. The recent favor enjoyed by manual training, nature study, self-government, and other active phases of school life is an index of the general movement in mind.

Its influence has not only forced the introduction of new subjects; it has changed the manner of presenting the older subjects of the elementary curriculum. Arithmetic has responded along with the other subjects and an active use of objects by the children themselves is found in increased degree.

VI. THE USE OF METHODS OF RATIONALIZATION.

It is perfectly natural that, in shifting the teacher's attention from her own activities to those of the children, the interest of the child should be considered in increasing degree. If the child is to learn directly, with a maximum use of his initiative, it is absolutely essential that the teacher should provide some motive. This implies that the child is to be interested in some fundamental way in the activities in which he is to engage. Instead of thumbing the fundamental facts with his memory, in an artificial and effortful manner, "singsonging" the tables rhythmically, so as to make dull business less dull, the teacher begins at once to use the child's own life as the basis for instruction. The number story, the arithmetical game, playing at adult activities, constructive work, measuring, and other vital interests of the child and community life become increasingly the basis of instruction in number. Such is the pronounced tendency wherever the movement is away from the traditional rote-learning or drill.

Of course there is the slight tendency in American elementary schools where a soft and false interpretation of the doctrine of interest is gospel to teach only those things which can be taught in an interesting fashion. But this tendency is less operative in arithmetic than in other subjects. Here the logical interdependence of one arithmetical skill on another has quickly pointed the failure of such a haphazard mode of instruction.

There is, however, in "advanced", as well as in reactionary quarters, a revolt against the tendency to objectify, explain, or rationalize everything taught in arithmetic. On the whole it is a discriminating movement, for this opposition to "rationalization" in arithmetical teaching, and in favor of "memorization" or "habituation," bases its plea on rational grounds, mainly derived from the facts of modern psychology.

It is specifically opposed to explaining why "carrying" in addition, and "borrowing" in subtraction are right modes of procedure. These acts are to be taught as memory or habit, inasmuch as they are to be performed by that method forever after. To develop such processes rationally or to demand a reason for the procedure once it is acquired, is merely to stir up unnecessary trouble, trouble unprompted by any demands of actual efficiency.

A study of the actual arithmetical facts upon which this opposition expresses itself suggests the four following general principles as to the use of "rationalization" and "habituation" as methods of mastery: (1) Any fact or process which always recurs in the same identical manner, and occurs with sufficient frequency to be remembered, ought not to be "rationalized" for the pupil, but "habituated." The correct placing of partial products in the multiplication of two numbers of two or more figures is a specific case. (2) If a process does recur in the same manner, but is so little used in after life that any formal method of solution would be forgotten, then the teacher should "rationalize" it. The process of finding the square root of a number illustrates this series of facts. (3) If the process always does occur in the same manner, but with the frequency of its recurrence in doubt, the teacher should both "habituate" and "rationalize." The division of a fraction by a fraction is frequently taught both "mechanically" and "by thinking it out." (4) When a process or relation is likely to be expressed in a variable form, then the child must be taught to think through the relations involved, and should not be permitted to treat it mechanically through a mere act of habit or memory. All applied examples are to be dealt with in this manner, for such problems are of many types, and no two of the same type are ever quite alike. These laws will, of course, not be interpreted to mean that no reason is to be given a child in a process like "carrying" in addition. The reason is not essential to efficient mastery, but it may be given to add interest or to satisfy the specially curious.

VII. SPECIAL METHODS FOR OBTAINING ACCURACY, INDEPENDENCE, AND SPEED.

It is not alone the first stages in the acquisition of an arithmetical process which have received attention in the reorganization of teaching methods, though, to be sure, the problem of first presentations has in recent decades been given the most attention. More and more the American tendency is to watch every step in the learning process, to provide for all necessary transitions, and to safeguard against avoidable confusions. It might be suggested that constant intermediation of the teacher in the child's work at every step might destroy the pupil's initiative and independence. Apparently, however, those who are so deeply interested that the child should not be permitted to fall into the errors which unsupervised drill would convert into habit, are fully as cautious to provide steps for forcing the child to assume an increasing responsibility for his own work. The distinction made is that an over-early independence is as fatal to accurate and rapid mathematical work as an over-delayed dependence.

One of the specific controversies much argued in the primary school concerns the medium through which arithmetical examples and

problems shall be transmitted to young children. There are three typical ways in which a situation demanding arithmetical solution may be brought to the child's mind: (1) The situation when visible may be presented through itself; that is, objectively; (2) the situation may be described through the medium of spoken language, the teacher usually giving the dictation; (3) the situation may be conveyed through written language, as when the child reads from blackboard or text. Inasmuch as objects are a universal language, no difficulty arises through this basic method of presentation. It is when a language description of a situation is substituted for the situation itself that difficulty arises. The child might be able to solve the problem if he really understood the situation the language was meant to convey. Owing to the difficulty that primary children have in getting the thought out of language, it has been urged that problems in any unfamiliar field should be presented in the following order: (1) Objectively or graphically; (2) when the fundamental idea is grasped, through spoken language; and (3) after the type of situation is fairly familiar, through written or printed language. It is seriously urged by some teachers that no written presentation should be used in the first four grades. Such an extreme tendency would practically abolish the use of primary textbooks. There are many exceptional teachers who do not put a primary text in the hands of children at all. Such a tendency is increasing. Particularly is this true among primary teachers in the schools of the foreign quarters of large cities. Accurate communication through the English language is always more difficult here. Hence, the period of objective teaching is necessarily prolonged, dependence on the "number stories" told by the teacher increased, and the solution of written problems much longer delayed than elsewhere.

The situation is somewhat different, almost the opposite in fact, when "examples" rather than "problems" are presented, meaning by "example" a "problem" expressed through the use of mathematical signs. It is easier to present "examples" in written form on blackboard or in text than it is to dictate them orally. This obviates the necessity of holding the examples in mind during solution. The permanence of the visual presentation saves the restatement frequently necessary in oral presentation. Hence it is a common practice to supply the youngest children with mimeographed or written sheets of "examples." It is with older children or with younger children at a latter stage in the mastery of a typical difficulty, that oral presentation of examples is stressed. Then we have that type of work which is called "mental" or "silent" arithmetic.

There is some tendency toward the provision of better transitions from the objective presentation of applied problems to the symbolic presentation of abstract examples. The nature of such a transition

is scarcely reasoned out as so much psychological science, but is the accompaniment of a widening professional movement for the enlarged use of pictures, diagrams, number stories, and the like. A critical examination of the various means of presenting arithmetical situations would order them as follows in making the transition from objective concreteness to symbolic abstractions: (1) Objects, (2) pictures, (3) graphs, (4) the concrete imagery of words, (5) more abstract verbal presentations, (6) presentations through mathematical symbols. No such minuteness of adjustment is apparent in existing methods, though it might seem desirable in teaching young children. There are four typical ways in which the child does his work, the names of which are derived from the differentiating element: (1) The "silent" method, otherwise spoken of as "mental arithmetic," "arithmetic without a pencil," etc. (2) The "oral" method, where the child works aloud—that is, expresses his procedure step by step in speech. (3) The "written" method, where the child writes out in full his analysis and calculations. (4) The "mixed" method, where the child uses all three of the previously mentioned methods, in alternation, as necessary for ease and efficiency.

The worth of these four methods of work is necessarily variable. The rapidity of the "silent method" with simple figures is obvious. The "silent method" and the "mixed method" (which is more slow but more manageable with complex processes and calculations) are the two methods normally employed in social and business life. The purely "oral" and "written" methods, with their tendency toward analysis and calculation fully expressed in oral or written language, are highly artificial. They are valuable as school devices for revealing the action of the child's mind to the teacher so that the same may be corrected, guided, and generally controlled. The present tendency is toward an over-use of these methods and toward an under-use of the other two, more particularly the "mixed" method. It would seem that there is little conscious attempt to make certain that the child moves from full oral or written statements to the judicious application of the more natural "silent" and "mixed" methods. It may be that full oral and written statements of work have seriously hampered the right use of the more natural methods of statement.

It is well to recall that in all these efforts to control the child's activity there is a tendency to leave the child overdependent upon the teacher. It is vitally important that a child should be kept free of any error which unsupervised drill would fix into the stubbornness of habit, but it is likewise important that the child should acquire some self-reliance. While not always clearly defined, there is a distinct tendency in the direction of releasing the teacher's control of the child. A characteristic practice would be one in which the

teacher's work with the child would pass through various stages, each one of which would mark a decrease in the control of the process by the teacher and an increase in the freedom of the child to do his example, or problem, by himself.

One characteristic series of stages quite frequently used in the presentation of a single topic in arithmetic, say "carrying" in addition, is the following: (1) The teacher performs the process on the blackboard in the presence of the class, the children not being allowed to attempt the process by themselves until after the process is clearly understood from the teacher's development. (2) The children are then allowed to perform the process upon the blackboard, where it is exceedingly easy for the teacher to keep the work of every child under her eye. An error is caught by a quick glance at the board and immediately corrected before the child can reiterate a false impression. (3) More of the same type of example, or problem, are assigned to the children at their seats, where they work upon paper, still under the supervision of the teacher; a supervision which is less adequate, however. (4) The same difficulty, after the careful safeguarding of the previous stages, is then assigned for "home work," where the child relies almost completely upon himself. Once more it is necessary to suggest that these stages are merely roughly implied in the variations of existing practice.

Most of the methods discussed in this chapter have had as their sanction the attainment of accuracy in thinking and calculating. Some efforts to insure independent power on the part of the child have already been noted. But nothing has been said of the effort to add speed to accuracy in getting efficient results. Such special efforts have been made. These efforts may be classified into two groups: (1) Those aiming to quicken the rate of mental response. (2) Those aiming at short-cut processes of calculation.

Typical of the first are (*a*) the use of an established rhythm as the child attacks a column of additions; (*b*) the device of having children race for quick answers, having them raise their hands or stand when they have gotten the answer; (*c*) the assignment of a series of problems for written work under the pressure of a restricted time allotment for the performance of each. These and similar devices are much used in the schools. They are open to the objection that they quicken the rate of the better students, but foster confusion, error, and discouragement among the less able children, not infrequently, actually retarding speed.

The various shorter methods which represent the effort to reduce the number of mental processes required are usually not of general applicability, and consequently have not attained any general currency in the elementary schools, where the object is to teach one generally available and effective method, even though it requires more

time, special expertness being left to later development in the special school of business which requires it.

It has come to be quite a common recognition of teachers that the fundamental element in rapid arithmetical work is certain and accurate work. If pupils know their tables of combinations and are sure of each detail of calculation, there is no confusion or hesitancy; speed then follows as a matter of course. This belief, as much as anything else, explains why the lower schools have developed few special means for attaining speed apart from those already mentioned.

VIII. THE USE OF SPECIAL ALGORISMS, ORAL FORMS, AND WRITTEN ARRANGEMENTS.

The methods of teaching arithmetic are influenced not only by the aims of such instruction, but by the peculiar nature of the matter taught. The use of special algorisms, temporary algoristic aids or teaching "crutches," oral and written forms of analysis are of considerable moment in determining the difficulties and therefore the methods of teaching. Their condition and influence will need to be given some slight notice.

The use of special and temporary algoristic aids or learning "crutches" in mathematical calculation is one of the problems of method under constant controversy. Teachers seem fairly evenly divided upon the question. Typical situations in which such "crutches" are used may be noted as follows: Changing the figures of the upper number in "borrowing" in subtraction; rewriting figures in adding and subtracting fractions, in the broad sense any algorism which is used during the teaching or learning process temporarily, to be abandoned completely later, is an "accessory algorism" or "crutch." The objections to their use lie in the fact (1) that skill in manipulation is learned in connection with stages and forms not characteristic of final practical use; (2) that this implies, psychologically at any rate, the waste of learning two forms or usages instead of one; and (3) that it decreases the speed with which mathematical calculation is done. If there is a drift in any direction, it is probably toward the abandonment of "crutches."

The division of opinion, which exists in connection with the temporary use of special algorisms or "crutches," likewise exists with reference to the use of "full forms" and "short forms" of manipulation and statement. The temporary use of a "full form," in a case where a "short form" will finally be used, is similar to the employment of a "crutch." There is one important difference, however, which explains the relatively larger presence of temporary "full forms" than of "crutches." The "full form" is an accurate form which is used somewhere, in a more complex stage of the same

process or in some other process; the "crutch" is not. Thus, a "full form," in column addition (with partial totals and a final total of partial totals) will be utilized in column multiplication; the "long-division form" of doing "short division" (that is the fully expressed form of dividing by a number of one figure) will be utilized in division by numbers of more than one figure.

The problem of form applies not alone to the algorism or special method of computation, but it likewise applies to the special methods of reasoning used in determining the specific series of steps to be taken in achieving the answer. In every problem the child solves he must not only decide what is to be done (reason), but he must do it (calculate). There are forms of reasoning as there are forms of calculation. As any calculation may have several algorisms the solution of a problem may be expressed in several forms. It is the latter difficulty which appears in the teacher's demands for "formal analysis" of problems. The analysis is usually required in full statement.

A conservative protest against the old formal expression of reasoned steps is found in omitting for the most part the linguistic statements dealing with the logic of the problem and merely "labeling" the numbers that occur in the calculation. This is a more restricted form of statement, much more used at the present time than hitherto. But it is still open to psychological objections that make the more scientific critics protest. There are many stages in a calculation where there is no association whatever with the concrete problem in hand. The concrete problem is studied, the decision is made that all the factors named are to be added. They are added, purely abstractly, and a number is given as the total. The result is then thought of in terms of the concrete problem in hand. A disposition to label each item in the addition may be necessary in the rendering of a bill, but it is a false and obstructing activity in the actual solving of the problem. The same situation exists where there are two or three processes to be utilized in series. Once the child has grasped his concrete situation and reasoned what to do he may proceed to mechanical manipulation, never thinking of the concrete applications till he is done.

The same tendency which is making for a reduction of verbal forms is increasing the use of mathematical symbols. As logical relations are less frequently written out, a simple sign such as $+$ or $\div$ is used. The algebraic x is supplied in place of a whole roundabout series of awkward preliminary statements or assumptions. With it, of course, come changed methods of manipulation, as in the use of the algebraic equation.

It is doubtless true that the rigidity of full logical forms is giving way to a more flexible and natural mode of expressing the child's

thoughts. Fixed oral and written forms of exposition may assist the child, much as the acquisition of a definite symbol fixes an abstract meaning, which remains unwieldy until it attaches itself to a word by which it is to be recalled. But increasing care is manifested that children shall use only those forms that will conform to practical need upon the one hand, and to natural, efficient, and economy mastery on the other.

IX. EXAMPLES AND PROBLEMS.

The teaching of arithmetic is usually classified under two aspects, formal work and applied work. The formal work deals mainly with the memorization of fundamental facts, processes, and other details of manipulation. The applied work, as the name implies, is the formal work utilized in the setting of a concrete situation demanding a solution. These two aspects of arithmetical instruction are very frequently sharply separated, the child working alternately with one or the other. The characteristic practice is to deal with them without relating them as closely as the highest efficiency would demand.

Formal exercises in arithmetic are usually presented through the "example;" the exercises in application through the "problem;" the distinction being that one is an abstract and symbolical statement of numerical facts and the other a concrete and descriptive statement.¹ In the first case the mathematical sign tells the child what to do, whether to add, subtract, multiply, or divide; the example being a kind of prereasoned problem, the child has only to manipulate according to the sign, his whole attention throughout being focused on the formal calculation. In the second case the child has two distinct functions: He must, from the description of the situation presented, decide, through the process of reasoning, what he is to do (add, subtract, divide or multiply), and, having rendered his judgment, he must proceed through the formal calculation.

As the problem involves two types of mental processes in a single exercise, and the example but one, the usual procedure in arithmetic is to take up the formal side through examples first and, later on, the applied side through the use of problems. This means that the first emphasis is on formal and abstract work rather than on a treatment of natural, concrete situations, an emphasis not wholly sanctioned by modern psychology and the better teaching procedure of other subjects.

¹ While this distinction is not general, it has sufficient currency to warrant its use here for the convenience of discussion. The expression "clothed problem" (from the German) is occasionally used to mean what is here designated as "problem," and "abstract problem" is used to mean what is here designated, as "example."

The reform tendency is found mainly in the primary grades where the beginnings of new processes are made through objective presentations of the problem. But the transition from objectified problems to formal work is not immediate. The children pass from objectified situations to "number stories," which are only descriptions or narratives of a situation. This is the interesting primary-school equivalent of that more businesslike language description found in the higher grades—the arithmetical problem. But it precedes formal work and succeeds it, the formal drill being a mere intermediate drill. Here concrete presentations and formal work are more closely related and more naturally ordered.

This reform tendency, which began in the primary school, is extending to the higher grades, where it is no longer rare to find the attack upon a process preceded by careful studies of the concrete circumstances in which the process is utilized. In the case of interest, several days might be utilized in studying the institution of banking in all its more important facts and relations. Such an approach not only provides motive for the formal and mechanical work, but it gives a necessary logical basis in facts. Hence, the understanding of practical business life makes accurate reasoning possible for the child when he is called upon to solve actual problems in application of the formal work.

It is perfectly natural under the general traditional practice of putting the first emphasis on mastery of the formal work that the largest amount of attention should be given to the mechanical and technical side of arithmetic, and that the concrete uses and applications should be slighted, and this is generally true of the practice of American teachers. Much more ingenuity has been used in the careful training of the child on the formal side than in teaching him to think out his problems. There is no such careful arranging and ordering of types in teaching a child to reason, as there is in teaching him to calculate.

Here and there a few thoroughly systematic attempts are made to carry the pupil through the simple types of one-step reasoning, to two-step and three-step problems with their possible variations. Just as the example isolates the difficulties of calculation, by letting the sign of $+$ or $-$ stand for the logic of the situation, there is a tendency to give problems without requiring the calculations. This affords a means of isolating and treating the special difficulties of reasoning. The child is merely required to tell what he would do, without doing it; the answer being checked by the gross facts. A little later, as a transition, he is permitted to give a rapid, rough approximation of what the answer is likely to be. With further command he tells what he would do and does it accurately. But such a program of teaching is still rare among teachers.

The care of the child's reasoning is largely restricted to testing his comprehension of the problem (1) by having him restate the problem to be sure he understands it, or (2) by having him give a formal oral or written analysis of the way in which he solves the problem. The first requirement may not be thoroughgoing, as the child may give a verbal repetition of the problem without really knowing its meaning. The second is a formal analysis of the finished result and does not represent the genetic method of the child's thinking. Consequently its formulas do not in any considerable degree assist him in his actual struggle with the complex of facts.

This lack of a systematic teaching of the technique of reasoning is manifest in the unreliability of children's thinking. When a child fails in a problem assigned from the textbook, the source of the error may be in one or more of three phases: (1) In failing to get the meaning of the language used to describe the details of the situation; (2) in failing to reason out what needs to be done to solve the situation; (3) in failing to make an accurate calculation. The first is a matter of language; the second, one of reasoning; the third, of memorization. The elimination of errors, due to the first and third sources, leaves a considerable proportion to be accounted for by the second. Such informal investigations as have been made seem to show that the children who fail in reasoning do not make any real effort to penetrate into the essential relations of the situation. They depend on their association of processes with specific words of relation used in the description of the problem, an association determined, of course, by their past experiences. As long as these familiar "cue" words are used, they succeed. Let unfamiliar words or phrases be utilized in their stead or let the relation be implied, and, like as not, the children will fail to do the right thing. Practical school people are familiar with the fact that children solve the problems given in the language of their own teachers and fail when the problems are set by principals or superintendents, whose language is strange to them.

A greater use of varied objects in the objective presentation of problems, and a more constantly varied use of language in the descriptive presentation of problems would prevent the child making such superficial and unthoughtful associations, and force him to think out connections between what is essential in a typical problem and the appropriate process of manipulating it. But such a deliberate application of modern psychology is far from being a conspicuous minority movement. The subject matter of the problems given to children has, however, improved greatly. Obsolete, puzzling, and unreal situations which only hinder the child's attempt to reason are less and less used in problem work.

Daily it becomes recognized with greater clearness that right reasoning depends upon a comprehension of the facts of the case, and the facts of the case in point must be within the experience of the child. This is the only way in which a problem can be real and concrete to him.

The recent effort on the part of textbook writers and teachers to make arithmetical problems "real" and "concrete" has not always recognized the above-mentioned psychological principle. The terms "real" and "concrete" have been interpreted in many ways, besides in terms of the child's consciousness. With some, "real" has meant "material," and the problems, more particularly with primary children, have, in increasing degree, been presented by objects or words connoting very vivid images. Others have defined these qualities in terms of actual existence or use in the larger social world. If these problems actually occur at the grocer's, the banker's, or the wholesaler's, it is said that they "are indeed concrete." And much effort has been expended in carrying these current problems into the classroom, in spite of the fact that they may be neither comprehensible nor interesting to the pupil.

There is another social world, nearer home to the child, from which a more vital borrowing can be made. There is an opportunity to use the child's life in its quantitative aspects, to take his plays, games, and occupations, and introduce their situations into his mathematical teaching. As his world expands from year to year he will be carried by degrees from personal and local situations to those of general interest. The teacher can provide this progression without devitalizing the facts presented.

There is another error into which both the socially minded radical and the specialist in child study fall. In their eagerness to improve the arithmetic problem, they assume that problems taken from the larger social world or from the child's experience are necessarily superior to hypothetical, imaginative, or "made-up" problems. The psychological fact that needs to be forced upon the attention of the reformers is that, with proper artfulness, an imagined problem may be even more vital and real to the child than one taken from life—as a situation in a drama may be more appealing and real to a child than one on the street. This has some recognition, but not enough. Those who stand upon the side of the "made-up" problems are more likely to be reactionaries who tolerate the traditional type of problem even though its stupid artificiality is obvious to both the teacher and the child. They might better be dealing with dull problems borrowed from real life than with specially invented dullness.

Of course there is another argument for the use of actual social materials. The child must ultimately come into command of precisely these facts, since their mastery will be demanded by the busi-

ness world. But must a primary school child study his arithmetic through problems taken from the dreary statistics of imports and exports merely because tariff reform is a political issue which every citizen ought finally to comprehend? There is a time for this, and, as is the case with most of such borrowed business problems, the time is later. In so far as these are current situations within the contacts of child life, let them enter. A quantitative revelation of life is important, and it is good teaching economy to gain knowledge by the way, provided it does not distract attention from whatever main business is at hand.

The socializing of arithmetical problems has one other additional good effect. It has tended to bring some topical unity into the problems constituting the assignment for a given lesson or group of lessons. Hitherto a series of problems was almost always composed of a heterogeneous lot of situations. There was no unity save that some one process was involved in each. The movement is now in the direction of attaining a more approximate unity within the subject matter of the problems themselves. The difficulties of attainment have restricted this movement to more progressive circles.

The eclectic source of arithmetic problems is apparent from the foregoing discussion. It would seem that some better texts would naturally be evolved through the implied criticism of each movement upon the other. Such is the case. Problems from child life emphasize the beginning condition to which adjustment must be made in all good teaching. Those from the greater world suggest the final goals of instruction. Those "made up" by the teacher call attention to what is too often forgotten, that the educative process in school may be artful without becoming artificial. Teaching is art, and when well done is not less effective for the fact.

X. CHARACTERISTIC MODES OF PROGRESS IN TEACHING METHODS.

The existing methods of teaching arithmetic in the American elementary schools are exceedingly varied. This is due to many causes. The democratic system of local control, as opposed to a centralized supervision of schools, has increased both the possibility and the probability of variation. Even within the units of supervision (State, county, and municipal) the opportunity for reducing variation in the direction of a more efficient uniformity is lost. This is partly due to the lack of a thoroughly trained staff of supervisors of the teaching process. Uniformity beyond the legal units of supervision has been restricted by the lack of organized professional means for investigation of and experimentation in controversial matters. Even such crude experiments as are being tried in more than one classroom, school, or system are unknown, unreported, unestimated, because no competent professional body gathers, evaluates, and dif-

fuses such knowledge. In this respect the teaching profession is far below the efficient organization of the legal and medical professions.

It is exceedingly difficult, therefore, to analyze the characteristic aspects of teaching method except as these are interpreted in movements of general significance. These may be actual or potential, traditional or reformatory, general or local, in present acceptance. The situation is one wherein tradition is mixed with radicalism, and radicalism modified by reaction. In this medley of movements there are dominant tendencies both traditional and progressive.

It is quite impossible to indicate the progressive tendencies with clearness save in connection with the discussions of concrete difficulties in mathematical teaching. The forces that are behind these tendencies may, however, be summarized here. For convenience they may be classified into eight types of influence, extending from more or less vague and general movements to very particular scientific contributions. No attempt is made to indicate the achievement of each; the form of each influence is only roughly defined and illustrative movements or studies suggested.

1. It is obvious that any general pedagogical movement which influences the professional attitude of teachers will influence the special methods of mathematical teaching. The appearance of the doctrine of interest made mathematical instruction less formal. The growing enthusiasm for objective work enlarged the use of objects in the arithmetic period. The child-study movement laid emphasis upon the child's own plays and games as a source of problems and examples.

2. Certain special movements in methods of teaching, local to the subject of mathematics, have also been effective. Here one has only to recall the "Grube" method, with its influence on the order and thoroughness with which the elements of arithmetic are taught.

3. The tendency of every teacher who is at all sensitive to the defects of his methods is to vary his daily practice. Constant trial, with error eliminating and success justifying a departure, is thus a source of progress. The new devices of one teacher are taken up by the eager professional witness and innovation is thus diffused. We have no ability to measure how much professional progress is due to individual variation in teaching and its conscious and unconscious imitation. The disposition of school systems to send their teachers on tours of visitation without loss of salary is a recognition of the value of this method of advance.

4. A far more efficient and radical source of change than that just mentioned is the deliberate, conscious, experimental teaching of progressive individuals. Some new idea or device occurs to the reader of original mind, and it is tried out with a fair proportion of resulting successes. An illustration of such a contribution is found in

one conspicuous effort to get more rapid column addition. The first columns to be added were allowed to determine the selection and order of addition combinations learned. Thus, if $6+7+9+6+7=35$, is the first column to be used, then the first combinations mastered will be $6+7=13$, $3+9=12$, $2+6=8$, $8+7=15$. Arising as a fruitful idea and seeming to give a measure of success, it has been carried, in the particular locality in mind, from school to school, and from system to system.

5. A prolific source of radical change is found in the critical application of modern psychology to teaching methods. Algorithms, types of difficulty, the order and gradation of these, as well as many other factors in method have been radically reorganized on psychological grounds. Examples of such psychological modifications of method are found in the "Courses of study for the day elementary schools of the city of San Francisco." Still more extensive critical applications are found in the "Exercises in arithmetic" devised by Dr. E. L. Thorndike, professor of educational psychology in the Teachers College, Columbia University.

6. Attempts have been made to inquire into the special psychology of arithmetical processes through careful experimentation and control. They have not been numerous, nor have they been influential on current practice. Such a field needs development. A typical attempt to investigate and formulate the special psychology of number is found in a Clark University study of "Number and its application psychologically considered."¹

7. Educational investigations as to the efficiency of existing arithmetical teaching among school systems, sufficiently varied to be representative of American practice, have also been conducted. These have usually gone beyond the field of the special methods of presentation employed in the classroom, and have inquired into the conditions of administration and supervision, the arrangement of the courses of study, and other similar factors. Dr. J. M. Rice's studies into "The causes of success and failure in arithmetic"² investigated such specific factors as: The environment from which children come, their age, time allotment of the subject, period of school day given to arithmetic, arrangement of home work, standards, examinations, etc. A subsequent study of similar type, but employing more refined methods is that of Dr. C. W. Stone on "Arithmetical abilities and some factors determining them."³ The main problem of this study was to find the correlation between types of arithmetical ability and

¹ Phillips, D. E. Number and its application psychologically considered. Pedagogical Seminary, vol. 5: 221-281, 1897-98.

² Rice, J. M. Educational research; Causes of success and failure in schools. Forum, 34: 281-297, 437-452, 1902-3.

³ Stone, C. W. Arithmetical abilities and some factors determining them. Columbia University contributions to education, Teachers College, New York City, 1908, pp. 101.

different time expenditures and courses of study. These two studies have probably attracted more general notice than any other studies of arithmetical instruction. While they have largely dealt with administrative conditions that limit teaching method, rather than with the details of teaching method itself, they have stimulated the impulse to investigate conditions and practices of every type.

8. The latest source of progress in teaching method is found in the movement for comparative experimental teaching under normal but carefully controlled conditions. Several such experiments are being conducted in the Horace Mann Elementary School of Teachers College, Columbia University, under the direction of Principal Henry C. Pearson, with the cooperation of the staff of Teachers College. The experimental work conducted by the instructors and students of the Teachers College is primarily designed to determine the relative value of competing methods in actual use throughout the country, the assumption being that every substantial difference in practice implies a difference of theory and consequently a controversy that can be resolved only on the basis of careful comparative tests. Two parallel series of classes of about the same age, ability, teacher equipment, etc., are selected for this work. One series is taught by one method; the other series by the other method. The abilities of these children is measured both before and after the teaching, and the growth compared. The standards and methods of this type of comparative experimentation, together with a list of current competitive methods requiring investigation, is given in Dr. David Eugene Smith's monograph on "The teaching of arithmetic."¹

SUBCOMMITTEE 4. PREPARATION OF TEACHERS FOR GRADES ONE TO SIX.

INTRODUCTION.

The fact that mathematical instruction in elementary schools is so universally given by teachers who teach most of the other elementary school subjects also, makes it difficult to isolate many of the specific elements of preparation entering into training for mathematics teaching. Departmental instruction below the seventh grade in mathematics is so rare as to be exceptional. The general preparation for mathematics teaching in the first six grades of the elementary school is therefore very largely included in that general foundation work which includes courses in psychology, the principles of teaching, and the principles and history of education, together with observation and teaching under supervision and criticism in a training or

¹ Smith, D. E. The teaching of arithmetic. Chap. XVI, Teachers College, January, 1909.

practice school. Besides this general type of pedagogical preparation, most normal schools and other training schools for teachers usually offer courses in "special methods" in teaching elementary mathematics, these courses furnishing practically all of that training which may be regarded as specific for the subject. The "special methods" course is usually given by an instructor who also teaches classes in secondary mathematics—advanced arithmetic, algebra, geometry, and occasionally trigonometry, or even more advanced courses which are offered as electives in a very few normal schools. In the larger schools, the head of the department may be assisted in this instruction, but he, himself, usually gives the work in "methods." The character of this work and the professional attitude of the instructors vary in a degree that makes generalizations relative to them almost impossible. The instructor may regard the "methods course" as simply a means for reviewing subject matter and the training school work as a sort of nuisance or as having no relation to his department, or he may give the course over almost wholly to questions of the psychology and pedagogy of mathematics teaching, using the training school constantly as a laboratory for instruction, demonstration, and experimentation.

Until the rapid development of normal schools within the last quarter of a century, in common with all other elementary school subjects, the only preparation required for teaching mathematics in the elementary school was such a course in elementary arithmetic as would enable the candidate to pass a relatively simple examination set by a county or city superintendent or a board of school directors. Even to-day, in most of the rural and village communities of this country, this is the method of providing teachers. These teachers have no academic preparation beyond the subject matter which they expect to teach, and no professional training at all. However, the rapid development of State normal schools and of city training schools has brought about a standard for teachers, adopted as fast as the supply will permit, of much higher academic preparation together with a minimum approximating two years of professional training. In this general advance of standards, mathematics has received a share of attention, although perhaps tradition has offered a handicap which has not been felt by the newer subjects in such a large degree. But within the last decade the whole subject of the teaching of mathematics has come to receive the attention which it justly deserves. Yet, with all of the discussion which has developed, there is very little literature that deals specifically with the problem of present-day theory and practice in the preparation of teachers for the elementary school. The committee secured data for its conclusions by direct inquiry of typically representative normal schools and city training schools. By geographical distribution, 19.5 per

cent of these schools are in the Atlantic States, 21.9 per cent in the Pacific and Mountain States, and 58.5 per cent in the States lying between these groups. The inquiry concerned itself specifically with the amount required of prospective teachers in the subject matter of mathematics, the amount and kind of professional study, the relation of the department of mathematics to the training or practice school, and suggestions of constructive improvement or reform.

SUBJECT-MATTER COURSES.

For normal schools regarded as standard, as well as for city training schools, high-school graduation seems almost a fixed norm for the whole country as an entrance requirement. In mathematics it is usually assumed that students have had a high-school course in arithmetic of one term or semester, one year or more of algebra, and one year of geometry, usually plane. In some normal schools arithmetic is required of students "found wanting" in its subject matter. In many schools solid geometry, advanced arithmetic, advanced algebra, and trigonometry are offered as electives.

It is thus apparent that the teacher of mathematics in the first six grades has a knowledge of subject matter in formal mathematics far beyond any of the actual needs arising within these grades. That this knowledge of subjects beyond elementary arithmetic functions in the teaching of the arithmetic it would be very difficult to show. The formal and isolated character of the work in algebra and geometry, as they are usually taught, leaves them barren of any content values having a bearing upon anything which appears in the usual work of the first six grades. Even in the best normal schools there is little evidence that the work in algebra and geometry is any less academic than in the classical high schools. In the normal school "humanistic" values should certainly most fully reveal themselves.

PROFESSIONAL COURSES.

The professional courses and work include a course in arithmetic "methods" or in arithmetic with some attention to methods in all normal schools, observation and practice teaching in some form in most of them, and a course in the history of mathematics in 4.8 per cent of them.

The course in arithmetic "methods" is given during one semester in 73 per cent of the schools. In a few, not more than 10 per cent, it is given during but half a semester—from six to nine weeks. The character of this work differs markedly. In 27 per cent of the schools the work is largely a review of the subject matter of arithmetic, method being merely incidental. Over 14 per cent give practically the whole

time to method. With others it varies from one-tenth to one-half of the time.

In the methods work itself 41 per cent of the schools require the organization of definite units of subject matter for presentation in the grades and the writing of specific lesson plans as a part of the work. In a like number definite study is made of the elementary course of study as a whole. Games and recreational devices for motivation and drill are considered in 53 per cent of the schools. Forty-one per cent of the schools make some use of current literature on the teaching of mathematics, although one instructor replies that he does not, as "there is little in it that is useful." Other instructors indicate that they value the periodical literature as growing increasingly helpful and suggestive for their own work. Some form of mathematical museum is found in 34 per cent of the schools. This varies from "a small private collection" to rather pretentious collections of textbooks, periodical essays and addresses, illustrative apparatus and models, and standards of weights and measures of various kinds.

Observation of schoolroom teaching as a part of the work in methods is found in 46 per cent of the schools. The time devoted to observation varies from "three or four lessons a term" to "one-third of the course." In 7 per cent of the schools all observation work is in connection with practice teaching. The place and value of systematic, purposeful observation seem to vary greatly in the minds of instructors. That the lessons observed should be well taught, model lessons, is indicated by the fact that in 47.3 per cent of the schools definitely using observation the lessons are taught by critic teachers and in 36.8 per cent by the special mathematics teacher. The training school is used as a laboratory in the methods courses in 39 per cent of the schools. As schools of education which tend to furnish an increasing number of teachers prepared for normal-school instruction in mathematics develop possibilities of the training schools as laboratories, this phase of work in the preparation of the elementary-school teacher will doubtless increase.

Practice teaching in arithmetic is required of all students who graduate from 39 per cent of these schools. In one school it is required in at least two grades. In most other schools students do practice work in but two or three subjects and may be graduated without any practice teaching in mathematics.

The somewhat isolated condition of the department of mathematics from the training school is shown by the fact that in only 39 per cent of the schools does the teacher of mathematics aid in the supervision of the subject in the training school and that in only 27 per cent does the department of mathematics make or partly make the course of study for the training school. Cooperation in the development of the course of study and in the supervision of the teaching

of mathematics in the training school has been found to be of very high value in developing a professional attitude in the minds of prospective teachers through the multitude of live problems always before them and in whose solution they may participate.

More than 95 per cent of the schools discourage departmental work below the seventh grade. One school definitely advocates it from the fourth grade upward. A special type of training for primary teachers is provided in 24 per cent of the schools. Number work receives its proportion of attention in these primary methods courses when they are general in character. In 12 per cent of the schools there are specific courses in primary methods in number work.

From the suggestions for reform received from instructors, the following summary indicates the several types: "A better knowledge of subject matter." "Teaching to make subject matter vital." "Make the work closer to the children; more connection of the work with life." "Use more concrete examples; use more objective work." "Develop a more definite knowledge of practical applications." "Develop more work in the fundamental pedagogy of processes." "Develop a more definite idea of the relation of the work of each grade to the whole arithmetic course." "Develop a better knowledge of method." "The development of a good textbook in simple method." "Require successful practice teaching in arithmetic for at least 10 weeks." "Make more of observation; observe more skilled teachers." "A general course for all, followed by a more intensive course for the particular grades in which the teacher is to work."

SUMMARY OF DATA.

From the foregoing data, it is evident that great differences in ideals and practice exist with reference to the following points: There is variation from method as a mere incident to subject matter to the use of full time for method in "methods" courses; from no use whatever of current literature on the teaching of mathematics to "very extensive" use of such literature; from no consideration of games and recreational devices to very careful consideration and testing of these; from no consideration of the course of study in arithmetic for the grades to the full development of such a course and the organization for presentation of certain of its units; from no mention at all of the history of the development and teaching of mathematics to the establishment of well-organized courses in this subject; from no observation of lessons in arithmetic in the grades in connection with methods courses to one observation lesson each week during the course; from no practice teaching at all required in mathematics to practice work in arithmetic for all in at least two grades; from no supervision of practice work and the teaching of mathematics in

the training school by the teacher of mathematics to close, jointly responsible supervision with the grade supervisors; from positive discouraging of departmental teaching of mathematics in the grades to positive advocating of it in middle and upper grades; and from no differentiation in training for the grades to courses in detailed special methods for primary grades.

There are also evident the following points of general uniformity: Entrance requirements to methods courses in arithmetic are quite uniformly high-school courses of about one-half year's work in arithmetic, one year in algebra, and one-half year or one year in plane geometry. Some kind of methods or teacher's course in mathematics is found in all. Some form of observation work either in connection with the course in arithmetic methods or with general method or practice teaching is advocated by all. In general, departmental work below the seventh is discouraged. No school is fully satisfied with its present practice.

Suggestions for reform are of four types: Greater knowledge of subject matter; a reorganization of arithmetic material, giving it more vital relationship to the child's life and to social life; a more intelligent knowledge of the pedagogy of arithmetic; and a closer, more vital relationship between the department of mathematics and the teaching of arithmetic in the training school. Three ways are suggested for bringing about this last relationship: By more systematic observation of work in the grades, by more responsibility for the course of study and the methods of teaching in the grades, and by closer supervision of practice teaching in arithmetic by the department of mathematics.

CONSTRUCTIVE SUGGESTIONS.

From inferences based upon the foregoing, and from reflection upon the general problem, the committee believe that the best theory and practice of to-day point to the following conclusions: That a foundation in subject matter as a basis for the professional study of mathematics for teaching the subject in the first six grades of the elementary school should include a minimum of one-half year in high school arithmetic, one year of algebra, and one year of geometry; that, exclusive of all courses in psychology, pedagogy, principles of teaching, general method, or history of education, a minimum of one-half year's professional study of arithmetic should be required to include the following: A course in "special method," the teaching of elementary mathematics which should consider the more elementary phases of the psychology of number; principles of general method in their application to arithmetic; educational values of arithmetic and the place of arithmetic in the general educational

scheme; the organization of the elementary school curriculum in arithmetic; the organization of typical units of subject matter for presentation to appropriate grades; the development and writing of typical plans for teaching; the utilization of local and general economic studies for number application; the observation and discussion of typical lessons in the grades showing concrete applications of principles developed; the place of games and other recreational devices in lower grade work in number, and the historical development of the teaching of arithmetic, showing the place and value of certain "methods," as the Grube, Speer, etc.

The committee believe, further, that every school engaged in the preparation of teachers of mathematics should develop a museum or teaching collection of materials—apparatus, books, pamphlets, papers, etc.—which will aid in interpreting the historic development of the subject, present day practice, textbooks, etc.; that the head of the department of mathematics should be largely responsible for the organization of the course of study in mathematics in the training school in cooperation with the department of education and the supervisors in the training school; that the head of the department of mathematics should aid in the supervision of the teaching of mathematics in the training school; and that he, as well as the supervisors or critic teachers, should be able to give demonstration lessons in the training school illustrative of principles of teaching developed in the "methods" class, and that the points of emphasis in all observations, discussions, plans, and criticisms should be upon the basis of fundamental principles rather than upon petty details.

The aim in the whole professional consideration of mathematics for teachers of these grades is, broadly, to give acquaintance with the fundamental principles of teaching arithmetic, of the organization of its subject matter, of its place in the educational scheme, and of its historic development. The teacher should be given the pedagogical outlook and perspective of arithmetic, as well as the ways and means of teaching its details. He should know enough of the psychology of number to enable him to secure healthy interest and adequate drill and to sacrifice neither at the expense of the other.

The greatest problem of all at the present time would seem to be to find teachers for departments of mathematics in normal schools who themselves have the wide pedagogical outlook desired for such work. When teachers can be found who have its larger perspective and who will regard the training school as the laboratory for developing insight, intelligence, and a minimum of skill in the teacher to be sent out into the field at large, this vital, daily union of theory and practice will do much to increase the efficiency of the prospective teacher in elementary mathematics.

SUBCOMMITTEE 5. MATHEMATICS IN GRADES SEVEN AND EIGHT OF THE PUBLIC AND PAROCHIAL SCHOOLS.

SCOPE OF THIS REPORT.

It was desired that this subcommittee make a special study of the following topics for grades seven and eight in public schools and in parochial schools: (*a*) The organization of the schools. (*b*) The mathematical curriculum in each type of school. (*c*) The question of examinations from the point of view of the schools. (*d*) The methods employed in the teaching of mathematics. (*e*) The parochial schools.

It was desired that the report present both present conditions and tendencies.

SOURCES OF INFORMATION.

In addition to general knowledge of the ground covered by this report, use has been made of the following sources of information: (*a*) The teaching of elementary mathematics. Prof. David Eugene Smith, Macmillan Co. (*b*) The teaching of arithmetic. Prof. David Eugene Smith, Teachers College Press. (*c*) The teaching of mathematics. Prof. J. W. A. Young, Longmans, Green & Co. (*d*) Courses of study of leading cities. (*e*) Responses to a questionnaire sent to leading cities.

DEFINITIONS OF TERMS.

The term elementary education is probably not as well defined as it might be. In general it is that education which by common practice is deemed desirable and necessary for preparation for the duties and rights of citizenship. It is made compulsory as a rule by the laws of the various States for children between the ages of 6 and 14 years. The term public as applied to schools is used to denote those schools which are conducted at the expense of and under the control of the various State and local political units; tuition in these schools is without expense. For a more complete discussion of the units see the report of the general committee number one. The term "grade" is used to denote each of certain divisions into which the work of the elementary schools is divided. As a rule there are eight such divisions. One school year of from 35 to 40 weeks is required for a pupil to complete the work of one grade, excepting that bright pupils are permitted to do the work in less time. In larger cities a year or two of preliminary (kindergarten) work for children between the ages 4 and 6 is sometimes given. The eight main divisions are called respectively the first grade, second grade, etc. In some parts of this country, notably New England, there is a slightly different division of the course. The function of this committee is to study the mathematical work in the last two grades of the elementary course.

SPECIAL INTEREST IN THESE GRADES.

There are several reasons for special interest in the work of these grades. The mathematical function of the first six grades is to give the pupils control over the mechanics of arithmetic, over the fundamental number, facts and processes. The function of the upper grades has not been as well defined. There are several influences at work affecting the whole curriculum of these two grades, and especially the mathematical course. The results of certain psychological studies are especially applicable here; these two grades comprise the last part of the compulsory education of the children; they precede the high school; they correspond with certain sections of the school course of European schools, which are included in the secondary curriculum.

INFLUENCE OF PSYCHOLOGICAL STUDIES.

No effort will be made to go into great detail on this point; attention will be directed briefly to certain conclusions reached by psychologists, which are especially effective in modifying the mathematical work.

The doctrine of formal discipline is accepted now in only a modified form so that it is no longer deemed sufficient to claim for any subject that it has great disciplinary value. The educational value of all subjects, including mathematics, has been and is being subjected to close scrutiny with the result that subjects and subject matter long retained in the curriculum, through regard for tradition, are being displaced by new material, equally valuable as means of training, but more representative of current life. When this is not the result, old material is frequently dropped without any such substitution, on the ground that it neither has valuable content nor is necessary as means of training. As in all reforms, there is a tendency to go to extremes in this, especially with regard to mathematics. The willingness of the mathematicians to subject their science to the test of the new doctrine has invited the less sympathetic scrutiny of others who are not interested in the subject. The result is a tendency to demand more of mathematics in this respect than of other subjects.

The doctrine of interest as essential in training the will is generally accepted as valid. Systematic efforts to study child life and needs have served to call attention to the special interests of children between the ages of 12 and 15 years, who are just entering the adolescent period of life. The importance of safeguarding nervous energy at this time is generally recognized; the need of training the hand and the eye along with the mind, the necessity of vital contact with new material rather than theoretical study as a basis of real interest and comprehension are among the results of this movement.

INFLUENCE OF COMPLETION OF ELEMENTARY COURSE.

A large majority of the pupils of the schools do not go on to high school after completing the eighth grade. There are many reasons for this. The laws of most States do not permit the employment of children under 14 who have failed to complete the eighth grade. Many who are kept in school thereby avail themselves of the opportunity to seek employment as soon as they have completed the grade. In many cases the need of getting employment is urgent; in others, the opportunity to do so, the fact that the organization of the schools makes completion of the eighth grade a definite scholastic achievement, and the interests of pupils at this age lead many children to leave, even when their parents are in financial position to send them to high school. Many parents and pupils feel that the next stage of education is dominated too much by cultural ideals of education of so general a nature that the pupils are not trained for any form of remunerative employment. As evidence of this belief one may point to the large number of pupils who have graduated from the eighth grade who attend private schools where tuition is charged, called commercial schools, and to the fact that new forms of secondary education which have been provided in some localities seem to meet a real demand without in any way decreasing the demand for the customary forms of secondary education. For these various reasons there is a large shrinkage in the school population in the passage from the eighth grade to the high school.

Those in control of the educational work of the country are more and more allowing this fact to influence the course of study in the seventh and eighth grades. There is increasing emphasis on such training as will definitely equip the graduates for their future lives as individuals and as citizens of the community. Forms of manual training are provided and commonly, when it is impossible to furnish the equipment for all of the grades, provision is made for the pupils of the two upper grades. Owing to the realization that this vocational training is inadequate, there is at present a growing interest in industrial training. This movement which is destined to spread is certain to have its effect upon the mathematical work of the seventh and eighth grades.

INFLUENCE OF PREPARATION FOR HIGH SCHOOL.

It has been mentioned that many pupils who are ready for the high school fail to enter. It has been felt that some pupils might be led to go on to the high school if they could have in the eighth grade the beginnings of some of the high school subjects. For this reason, Latin, algebra, and a modified English course are urged as desirable

eighth grade work in the hope that pupils will be unwilling to discontinue these subjects after they have once started them. In more recent years there is a reaction against this plan on the ground that these subjects are not properly within the scope of elementary education as defined. At the present time there are the beginnings of a new administrative policy to accomplish the same end. Schools are being provided in some of the systems which are designed for pupils who do plan to go on to high school or whose parents wish them to have this relatively more academic training. In these schools algebra will easily find a place. It is likely that the future will see a growth of this idea.

Again, for various reasons, the pupils who enter the high school find the work of the first year unusually difficult, so that many of them leave school during this period. It has become customary on this account to speak of the "gap" between the eighth grade and the high school, and it is generally admitted that better articulation is necessary there. The efforts to "bridge the gap" have included attempts to modify the work both in first year high school and in the eighth grade. In the eighth grade there has been an effort to concentrate upon essentials of arithmetic on the one hand, and on the other to prepare the pupils for high-school work by introducing the beginnings of algebra into the eighth grade work. There are two tendencies to-day which are likely to lessen the influence of preparation for high school as a modifying force in the eighth grade; first, there is the spirit of independence which characterizes the efforts of each of the larger units of the educational system, as an evidence of which in the elementary school is the belief that their main function is not that of serving as a feeder for the high school; and second, the spirit of responsibility on the part of each unit to take up its work where the previous unit has left off. This latter tendency is much more noticeable among secondary mathematics teachers than formerly.

INFLUENCE OF EUROPEAN CURRICULA.

The object lesson of European schools which provide under one administrative unit educational facilities for children from the age of 9 or 10 to 19 or 20, inclusive, has furnished considerable support for the idea that the essentials of elementary school work should be completed in a shorter time so that pupils may be started upon their secondary education at an earlier age. This has been urged, especially in mathematics, where it means a change particularly in the upper grades. This idea received the support of the committee of fifteen and the committee of ten of the National Education Association.

While four influences have been enumerated, it is clear that each affects the others, so that they are not independent. In particular this last is intimately associated with the preceding one. These two

in a sense are antagonistic to the other two since these place the emphasis upon secondary education, while the others throw emphasis upon the elementary phase of education. The last two are still in favor among the schoolmen especially, as in the past, whereas the former are supported equally by public opinion.

RURAL AND PRIVATE SCHOOLS.

The schools of the rural districts do not feel all of these influences as strongly as do the urban schools. There is a growing effort to adapt the rural schools to the needs of the community, a movement identical with that noted in connection with urban schools. There is strong feeling of the importance of directing attention to the advantages of agricultural life. This influence will increasingly affect the work of the upper grades.

In private nonparochial schools the influences mentioned in paragraphs 7 and 8 are especially potent. The pupils of these schools usually go to the high school and college. In parochial schools, there is usually reflected some of the educational policy of the public schools, in addition to the special educational policy of the parochial school. In the eighth grade of parochial schools the special function of these schools reaches its consummation in the specific training of the pupils in such sectarian studies as enable them to enter the church with which the school is connected.

ORGANIZATION OF THE GRADES.

In organization there is nothing particularly distinctive about the seventh and eighth grades. In their relation to the grades below they come under the general school administration which controls the first eight grades. For a discussion of this organization see the report of the committee on general elementary schools. In their relation to the schools above there is some difference. At the close of the eighth grade the pupils are usually given a diploma as a sign of having completed a definite stage of their education. This diploma as a rule entitles the holder to admission to the high school of the same system and usually of any other school system. The diploma is obtained after compliance with the ordinary requirements for promotion. Promotion is determined by the teacher of the class with certain requirements in the way of examination, which will be discussed in a later paragraph. In some cases a special examination is required before a pupil is promoted to the high school.

THE MATHEMATICS CURRICULUM.

There is a lack of uniformity in the curricula in these two grades greater than in the lower grades. Two classes of curricula must be considered: (a) Those which do not provide any work in algebra and geometry; (b) those which do provide such work.

For those schools which do not provide any algebra in the eighth grade (and in the country at large these schools are in the majority), the mathematics course may be arranged on the topical plan, the spiral plan, or a combination of the two. By a topical plan is meant one in which the subject matter is divided according to mathematical topics; numeration, notation, and the four fundamental operations are discussed in order for integers, then the same topics for fractions in the common form; then for fractions in the decimal form; then percentage; then the applications of percentage to business life. By a spiral plan is meant one in which within a given range of numbers, say one to one hundred, notation, numeration, and certain processes are considered; later the range of numbers, the kind of numbers, the processes, and the difficulty of the applications are extended repeatedly. By a combination of the two plans is meant a course in which, while the spiral plan is adopted in spirit, at various stages of the course certain mathematical ideas are stressed so that thereafter they may be counted on as part of the working knowledge of the class, subject to recall after only slight review.

In the past the topical plan has been especially in vogue; at the present time more progressive courses of study are modeled after the third plan; the second plan has had some support, but has never had very general favor. It is probably true that the topical plan in its extreme form or in a modified form is the common plan in the majority of the schools of the country. By a modified form is meant that typified by a series of texts consisting of two or three books designed to furnish together the necessary material for an eight years' course. Each text usually covers the fundamental operations for integers, fractions, and decimals, with additional topics in each book. One book is to be used for from two to four years.

Usually the mathematics course is guided by such a text. In this event the pupils learn in the first six grades the fundamental processes for integers, fractions, and decimals, and denominate numbers. The work of the seventh and eighth grades consists of the following: A review of this foundation work; special attention to percentage and its most common application, simple interest; other business application of percentage; mensuration of plane and solid figures. The list of applications of percentage includes such topics as bank accounts, partial payments, commercial and bank discount, partnership, insurance, taxes, stocks and bonds, exchange, and interest. In mensuration is included the discussion of the area and the volume of the common plane and solid figures, square, and cube root. Besides these topics, the metric system, longitude and time, ratio, and proportion are commonly included in the texts. On account of the influences noted in former paragraphs, the tendency in the better schools of

the country is to work for thoroughness and utility by omitting such topics as partial payments, partnership, exchange, bank discount on interest-bearing notes, the more difficult work in stocks and bonds, longitude and time, some portions of the mensuration of solids, cube root, and the metric system. In short, there is great freedom in omitting such topics as are not in harmony with modern life or as have been found unnecessarily confusing for the pupils. The time thus gained is devoted to the remaining topics and to additional drill on the essentials.

The problem material is contained as a rule in the book which each pupil possesses. These texts are written for the country at large, not to suit local conditions. The problems are designed to illustrate the particular mathematical idea or application under discussion; they are usually miscellaneous in character. The influences noted in former paragraphs are responsible for a new attitude toward the problem material. An effort is now made to have one set of ideas running through a particular set of problems. For example, the arithmetical idea being discussed may be percentage; instead of giving as problems a miscellaneous lot of applications of the percentage idea, the problems may all be based upon information about the population of the country for a period of years. In other words, the problem material possesses a certain unity, as a result of which information is conveyed to the pupils on the subject from which the material is drawn. A second characteristic of the problems now coming into use is that they are selected so as to give the children some insight into industrial, business, and social conditions of the city, the State, and the country. Thus there are groups of problems about the railroad, the mining, the agricultural, the manufacturing interests; about the population, area, and the wealth of the city, the State, the Nation; problems drawn from the local newspaper; problems involving the local tax rate, local real estate values, local interest, discount and commission rates, the stocks and bonds of local corporations. This material the teachers must place before the pupils either orally or on the blackboard, although some school boards are issuing pamphlets containing these supplementary problems for use in their own schools. This is a serious attempt to socialize arithmetic. It makes the course consist less of figuring and more of discussion. Under banking for example, the nature, function, and conduct of a bank is discussed; under stocks and bonds, effort is made to show again the kinds, purpose, value, and manner of sale of bonds and stocks; under taxes, the various purposes for which taxes are collected and the sources from which they are obtained. The content of the problems is considered quite as important as the solution of the problems.

COURSES CONTAINING ALGEBRA.

The other type of course in mathematics includes some work in algebra, and sometimes in geometry. These courses vary even more than those discussed previously, because the work is relatively new. In some places the arithmetic work of these two grades is curtailed and condensed so as to be completed entirely by the end of the seventh grade or by the end of the first half of the eighth grade, the latter being the more common plan; the remaining time is then devoted to algebra. In other places, work in algebra is introduced into the seventh and eighth or the eighth grade without dropping the arithmetic; there is in this case little effort to bring about any vital connection between the two subjects; the time is merely distributed so as to cover the two subjects. Again, in a few places, an effort is made to introduce the algebra into the arithmetic course in a natural way.

When algebra is taught in either of the first two ways, the work is guided by a text. This text is in some cases a brief elementary algebra written for the eighth grade classes, or consists of a few chapters added on to the arithmetic text. As a rule, the sequence of topics covered is that of the usual high-school text. When the algebra is introduced in the third form, it is presented through the regular arithmetic text, where it is introduced as opportunity permits. For example, preceding the work in percentage, the first notions of literal numbers are introduced; then the percentage law is expressed as a formula, $p = br$. Thereafter this formula is used in the solution of problems, for example, such as require the determination of the rate when the base and the percentage are given. Later this literal arithmetic may be extended, although it is quite clear that no very extended amount of algebra can be introduced in this natural manner.

So far an attempt has been made to present briefly the various forms in which algebra is taught in the grades. No definite statistics are available to form the basis of a definite statement as to the prevalence of the teaching of algebra. One investigation showed that about 30 to 35 per cent of the schools of a certain class taught algebra and these were schools of the larger cities; taking the country at large, it is unlikely that more than this percentage of them teach the subject.

PURPOSE OF ALGEBRA IN THE GRADES.

Algebra was introduced into and is retained in the grades for a number of reasons. Some hoped thereby to interest some pupils in the subject to such an extent that they would be led to enter high school to complete it; others hoped that thereby the pupils who did

enter high school would have a more successful time in their mathematics work—in other words, it was a device for “bridging the gap.” With others, there was the desire to “abridge and enrich” the arithmetic course; after abridging it, they felt that the natural means for maintaining the mathematical element in the curriculum was to introduce the next higher mathematical subject, which happened to be algebra. It was hoped by some that the use of the literal number and of the equation would eliminate some of the difficulties the pupils experienced in analyzing and solving some of the arithmetic problems in the eighth grade course. Those interested in the mathematical element in education desired to carry to another stage of their logical generalization certain arithmetical ideas.

Two tendencies in regard to the position of algebra are to be noted. With the public at large, the subject has never appeared as one of any “practical” value. With the current tendency to exalt in the schools those subjects which appear to have “practical” value is coming a feeling that algebra does not have a place in the eighth grade, especially in the form in which it has been taught. One of the largest cities of the country has recently entirely dropped it from the course, replacing it by the study of certain phases of local history and local business and industrial conditions. Another city, somewhat smaller in size but recognized as progressive in educational efforts has introduced about the same idea into its course, although there the next tendency to be mentioned has been recognized. These efforts, entirely independent, are typical of the feeling in some of our school systems.

The other tendency is toward an extension of the third plan of teaching algebra. There is in this country a growing belief that in the past too sharp lines of demarkation have existed between arithmetic, algebra, and geometry and there are efforts being made to bring the three into closer relation. In the elementary school, as early as the sixth grade, certainly no later than the seventh, certain elements of generalized arithmetic should be introduced and should be carried along with the arithmetic until the pupils become familiar with literal notation and the equation. This work is not properly called algebra as the number field would not necessarily be extended to include negative as well as positive numbers. This form of literal arithmetic presents all that is practical of algebra for ordinary purposes. So much of it is decidedly of utilitarian value since the mechanics of to-day who wish to read trade journals need to be familiar with it. This form of literal arithmetic has in its favor most if not all that can be said for algebra as an eighth-grade subject.

It seems probable at the present time that these two tendencies will become more pronounced, i. e., there is almost certain to be more dissatisfaction with the extreme form of algebra brought down from

the high school, and as teachers are trained for the work, there is to be, it is hoped, greater interest in the form of generalized arithmetic outlined.

GEOMETRY IN THE GRADES.

The mensuration of certain geometric figures has always been included in American arithmetics. In recent years, as has been said, there has been a decrease in the extent of this work. It was formerly the practice to have this work consist mainly of definitions, formulas, and problems. This has been changed by giving experimental and intuitive verifications of the formulas. It has been uncommon to have any other form of geometry, except in isolated places where some form of constructional, inventional, or concrete geometry has been introduced. The motive has been to teach certain elementary ideas of geometric forms, to train the hand in the use of customary drawing tools, to train the eye in its judgment of geometric forms and relations, and to train the mind in such general functions as observation and generalization as pertaining to geometric data. This work has been attempted usually under the guidance of a pamphlet prepared for some specific school by those interested in such work.

The movement has not spread much. Possibly one reason for the slowness of the introduction of this work has been the custom of including in the art course usually given in American schools some "mechanical" drawing—constructions with the straightedge and compasses. This custom has been unfortunate, at least from the mathematical standpoint, as, in the drawing course, the emphasis has been upon the results; the possible cultivation of desirable habits of geometric study, and the possible training of the powers of observation and generalization have been largely neglected. A further reason for the lack of such is the scarcity of teachers acquainted with and prepared to teach geometry inductively. The majority have studied geometry only in the Euclidean form.

EXAMINATIONS.

Examinations given in the schools are of three kinds: (*a*) Those given by the teachers themselves; (*b*) those given by the supervisory officers of the schools; (*c*) those given by a school to determine the qualifications of pupils who wish to enter the school.

The examinations given by the teachers are of two kinds: The ordinary written recitation and the stated examinations which may be required by the school regulations. The first should not be called examinations in one sense of the word, since they cover usually only a short interval of previous instruction and are given as a means of affording the same sort of drill for all of the class or as a means of detecting weaknesses as a basis for further teaching. Such written

lessons are left entirely to the teacher, although it is advised that they be given frequently. Such "examinations" are in every respect desirable.

The other form of examination given by teachers is more formidable. Most school systems provide that the standing of a pupil in a class shall be determined in part by examinations given at stated times. The examinations may occur monthly, quarterly, semiannually, or annually. They count from one-half down in determining a pupil's standing. When the questions are prepared by the teacher, the questions and the papers are at the disposal of the principal or other supervisors. The teacher has an opportunity to adapt the examination to the capabilities of the class, and can allow for the individuality of the pupils. Under this plan a sympathetic influence is likely to pervade the examination. As a means of administration this form of examination depends for its success upon the teachers and the opportunity of inspection. As an educational practice it is to be commended as compared with those examinations which are not prepared with the same sympathetic recognition of the pupils' interests, which the teachers are likely to display.

As a rule uniform tests are given in most school systems for administrative purposes. The questions are prepared either by the superintendent or by a committee of principals or teachers—usually principals—working under the direction of the superintendent. In few cases do the teachers have any choice concerning the questions which they submit to their classes. The teachers grade the papers and then submit them to the principals. These examinations are given to set standards of work, to interpret the course of study, to promote uniformity throughout the system, to bring out the weak points in the teaching, and to point out conditions in the school. In some cases it is urged that these examinations train the pupils to prepare their thoughts on a subject in good order in a limited time. In general the interests of the pupils are served only indirectly by these examinations as the emphasis is upon the administrative advantages. The results are sometimes used in determining a pupil's fitness for promotion, although it is seldom that failure in these examinations is allowed to retard a pupil's progress.

These examinations are an effective administrative device. Their success depends upon the experience, the wisdom, and the ideals of the supervisory staff. As a rule, these examinations do not meet with favor among the teachers. There is a feeling that the test is one of themselves rather than of their pupils. From what has been said this appears to be true, although it depends upon the purposes of the supervisors. The better teachers recognize the advantages to be gained, and, having the proper professional spirit, they are willing to have their work compared with that of their colleagues in other

schools. The examinations are opposed also because of their effect upon the pupils. It is contended that the pupils are subjected to a severe nervous strain so that they do not do themselves or their teachers justice. This is possibly true. The evil results, however, may be minimized under wise supervision. If the teachers adequately prepare the pupils for the tests by reviews, and if the tests are adapted to the possible ability of the pupils, the evil results mentioned are not necessary. In the larger cities the difficulty of conducting these examinations is great, owing to the wide diversity in the population in various parts of the city. Another objection raised to such examinations is that thereby the teachers are hampered in their work, with the result that there is little progress from year to year. This again may or may not be true, dependent upon the supervision. As a rule, the supervisors of the schools will see that the tests promote rather than retard progress.

Another form of examination proposed at the present time is that designated as the "standardized" test. For a complete discussion of the nature of these tests, see the report by Dr. C. W. Stone, in the report of subcommittee No. 2 of this general committee. As to current practice, it is safe to say that little work of this nature is done in the schools. As to tendencies, there is little evidence upon which to base a statement one way or another. It would seem well for those in charge of the general tests just discussed to introduce into them such of the elements of these standardized tests as seem applicable to their needs and purposes.

In the eighth grade tests are sometimes given to determine the fitness of pupils for promotion to high school. This is not a common practice, however.

METHODS OF INSTRUCTION.

It is possible to speak only in a general way of methods of instruction as these vary with schools and with teachers. Much that can be said on this topic for the two upper grades would apply equally well for the other grades.

CLASS INSTRUCTION.

In all of the schools instruction is given to groups of pupils varying in number from 5 to 30 or more—groups called classes. The average size of classes is probably in the neighborhood of 20 and a strong effort is being made in all cities to cut down larger classes to this number. This form of instruction is called class instruction. There have been numerous attempts to modify this form of instruction by various forms of individual instruction in order to meet in a better way the needs of weak pupils. In some schools special teachers are

employed to take charge of any pupils from any class who are backward in their work. As a rule, however, the regular class teacher does this herself either before or after regular school hours. An effort is made of course to organize the classes so that all pupils in the class will have as uniform ability as possible.

RECITATION AND STUDY TIME.

In most schools the arithmetic class meets daily for from 20 to 30 minutes. This time is known as recitation time. Besides this the pupils of the class usually have in school another period of equal length for the study of arithmetic. This makes the total time for arithmetic vary from 200 to 300 minutes per week. In most schools the children do no studying on arithmetic at home; in the upper grades they probably do, although the tendency to-day is to relieve pupils of any home preparation in mathematics in the elementary schools. Each pupil possesses a book. This book is not merely a collection of problems; it is usually a text providing the necessary theory and such explanation as seemed wise to the author. From the terminology used to denote the two periods, it is obvious that at some time the pupils were expected to prepare themselves in the "study" period on certain assignments in the text upon which they later recited in the "recitation" period. This was especially true in the upper grades, and unfortunately is probably true in many classrooms to-day. In the majority of schools this condition has undoubtedly changed; the recitation period should properly be called the "teaching" period and the study period might better be called the "work" period. The class time was formerly given over often to indiscriminate recitation on the solutions which the pupils had performed outside of class; it is now given over either to carefully planned drill or to instruction by the teacher on some new topic. The study time is used to supplement the class time.

DIVISION OF THE CLASS TIME.

One of the characteristic features of the teaching period is the mental work. It is common practice to direct the teachers to devote from one-third to one-half of the class time to oral-mental work. It is oral in the sense that the teacher gives the directions orally; it is mental in the sense that the pupils perform the necessary computations without use of pencil and paper. The responses of the pupils are given either orally or in writing. This work is designed either to maintain efficiency through wise drilling on topics previously taught or to lead up to and teach some new topic. This must be considered a feature of current teaching method, since formerly much of the class

time was given over to "recitation" by the pupils on work which they placed upon the blackboard.

There are occasions when it is worth while to have the whole class solve problems in writing; this is especially true in the upper grades where the conditions of the problems become more confusing. As a rule, however, written work is done outside of class. In the past pupils have been required to present more or less elaborate analyses of the solutions for their problems. The desire was to have the pupil set forth in detail the process of thinking by which the solution was accomplished. The advantage of such solutions to the teacher is obvious; it is an equally obvious fact that such formality is entirely foreign to the natural, rational mode of presentation which an adult would use in ordinary life. Such a requirement is subject to criticism also because it confuses the pupils. The tendency now is to ask the pupils to give a clear presentation in good form; in the upper grades, they are encouraged to use any "short cuts" of which they know, and to do mentally as much of the computation as they can. Another reform which has been accomplished is the discontinuance of elaborate forms of ruling on the papers, a practice which has been altogether too prevalent in the past.

RAPIDITY AND ACCURACY.

The teachers of the upper two grades seek to develop in their pupils skill in computing which will enable them to perform ordinary calculations with rapidity and accuracy. In the lower grades the pupils are taught the processes and the number facts; in the upper grades the emphasis is properly turned in this other direction.

The mental work has this as its aim. The pupils are frequently given problems to solve in a limited amount of time; they are encouraged to compete with one another by being invited to rise when they have solved the problems; they are given honorable notice in various ways for achievement in these respects.

CONCRETE METHODS.

On account of the influences mentioned in former paragraphs, the teachers endeavor to make the instruction as concrete as they can without going to the extreme of objectifying relations which are obvious. Thus in the discussion of commercial forms, actual samples are exhibited; checks of some real or imaginary bank are drawn in class; account books are kept by the pupils and are balanced monthly, each child filling in records of real transactions when possible; interest-bearing and noninterest-bearing notes are shown; banks are visited or conducted in the schoolroom; the class resolves itself into a stockbroker's office, one member acting as the broker and the

remaining members of the class acting as buyers or sellers of stocks or bonds. In mensuration, actual measurements are used when possible; problems are sought in the manual training department; formulas are obtained by experimental methods instead of being taken on faith and then used. The teachers endeavor to give to their classes clear impressions of a few things rather than superficial word knowledge of many things.

DEPARTMENTAL TEACHING.

One especially characteristic feature of the seventh and eighth grade work is the practice of having the mathematics, and some of the other subjects, taught by teachers who as a rule teach no other subjects. In the lower grades this is not common. This is known as departmental instruction. It is quite common in the larger school systems and is being extended as rapidly as circumstances permit. The teachers in charge of the departmental work are usually the more experienced teachers of the system and as a rule have had special training for their work. In many cases college graduates are obtained for these positions, whereas usually the teachers in the elementary schools do not have collegiate training.

Departmental instruction is favored because of the obvious advantage of having for this upper grade work teachers who are specially interested in and qualified to teach their subject. Departmental instruction has the disadvantage of placing the training of young children in the hands of each of several teachers, working independently, with the result that often the emphasis is placed upon teaching the subject rather than upon the education of the child. This difficulty is obviated by wise supervision, under which there will be cooperation between the various departmental teachers in any one school.

INDUCTION AND DEDUCTION.

It is very likely that no conscious thought is given to these two types of teaching methods by the majority of teachers. At the same time it may be said that the instruction is either by inductive methods or by rule followed by practice. The habit of proceeding from "the known to the unknown," from "the simple to the complex," is so characteristic of the teachers that they approach new topics whenever it is possible by inductive means. For example, the nature and the meaning of "paying interest" for the use of money may be approached through the acquaintance the pupils have with the practice of paying "rent" for the use of a house; the nature and meaning of shares of stock may be approached through the pupils' experience in contributing their share toward the expense of a picnic. On the

other hand, when it comes to a process such as finding the square root of a number, the books as a rule develop the process in the usual way with the aid of the formula for the square of a binomial; but the teachers are commonly advised to simply illustrate the process and then fix it in the minds of the pupils by adequate drill.

THE PAROCHIAL SCHOOLS.

This investigation covers the field embraced by Roman Catholic parochial schools, which number in the United States 4,845, having a total registration of 1,237,250 pupils. These schools outnumber other schools maintained by any single church organization, and for this reason they are selected for this investigation. In general they do not charge any tuition, unless to pupils not residents of the parish. They are in most cases supported by the Roman Catholic Church from a fund voluntarily contributed by members of the church. In many instances, however, where such a fund does not exist tuition is charged at 50 cents a month for the lower grades and \$1 a month or more in the higher grades.

The committee finds none of them to be endowed in any way or to receive any State or municipal support.

The Roman Catholic Church divides the United States into 70 dioceses, in each of which a board of supervisors has charge of the educational work in the parish schools. It is the business of the diocesan board to make out the course of study for the various schools, select the books to be used, and to pass on any matters pertaining to the work of the schools.

The teachers, being generally members of religious orders, are appointed by the superior of the order to which they belong, as recommended by a committee acquainted with the attainments of the candidates. The different religious orders have a community inspector of schools who reports to the superior on the efficiency of the teaching staff. The following syllabus of mathematics as taught in the seventh and eighth grades is selected as representative of the better class of schools and is from the Philadelphia diocese.

ARITHMETIC—SEVENTH GRADE.

(1) Drill exercises for accuracy and speed. (2) Miscellaneous problems involving fractions. (3) Multiplication, division, and miscellaneous problems on decimals. (4) Denominate amounts: (*a*) Measurements, extending to circle and cylinder; (*b*) compound amounts in use; (*c*) longitude and time. (5) Percentage: (*a*) Review and extension of sixth year's work; (*b*) bank discount. (6) Ratio and proportion: (*a*) Ratio; (*b*) simple proportion; (*c*) proportional parts.

ARITHMETIC—EIGHTH GRADE.

(1) Common and decimal fractions; underlying principles considered and applied. (2) Denominate amounts. (3) Percentage: (*a*) Review and extension

of seventh year work; (b) stocks and bonds; (c) compound interest; (d) drafts and exchange; (e) partial payments. (4) Proportion and partnership. (5) Powers, roots, and mensuration. (6) Review of practical measurements: (a) Plane surfaces; (b) triangles, quadrilaterals, regular pyramids, right cylinders, right cones, frustums of regular pyramids, and cones, spheres; (c) similar figures.

ALGEBRA—SEVENTH GRADE.

(1) Explanation of algebraic terms to be employed and illustrations of their uses. (2) Literal expressions; their numerical value obtained. (3) Comparison of arithmetical and algebraic solutions of simple problems, and solution by algebra of many such problems. (4) Positive and negative quantities explained and practical problems employing their uses considered. (5) Addition and subtraction. (6) Parentheses. (7) Multiplication and division.

ALGEBRA—EIGHTH GRADE.

(1) Review of addition, parentheses, multiplication, and division. (2) Composition and factoring. (3) Highest common divisor and lowest common multiple. (4) Fractions. (5) Simple equations.

The average age of pupils entering the seventh grade is between 12 and 13 years, and at leaving the eighth grade about 14 years. In about half the schools reporting, promotion from grade to grade is determined by the teacher. In the remaining schools promotions are recommended by the teacher and determined by the principal. All schools average the class work and examination in determining promotion, usually each counting 50 per cent, but a few giving two-thirds credit for class work. In the case of seventh and eighth grade examinations, some schools give the questions as made out by the city superintendent of public schools, and papers are marked by public school authorities for eighth-grade examinations. Where Catholic high schools exist the principal and teachers make out the questions, while the examination is conducted by the teacher and the papers are inspected by higher authorities. About one-fourth of the schools permit of a choice of ten questions out of eleven, the others allowing no choice.

Regarding promotion after failure to pass in a mathematical subject, a wide diversity of practice exists. The question asked in this respect was, "To what extent does failure in a mathematical subject retard a pupil's progress?" Some answers received were as follows: "As a rule, a mark below 60 per cent in any mathematical class requires a repetition of the class"; "Considerable deficiency influences a pupil's promotion"; "Not kept longer than two years in a class"; "Mathematics is one of three studies on which promotion is based"; "Conditional promotion is given, but is withdrawn if progress is not made"; "Must cover program again"; "Must stay in class"; "Those notably deficient are not promoted"; "Debars pupil from promotion"; "Passes to next year's grade if only failure is in mathematics."

Promotions are made annually or semiannually about equally. In regard to the object influencing the teaching of mathematics, preparation for high school stands first, the demands of the business world second, and about 20 per cent report discipline and culture as the predominating influence.

Oral work in class, which is given in all schools, varies in extent from 12 minutes to half the recitation period daily, and nearly all schools report a preliminary discussion of newly assigned topics until a sufficient knowledge to proceed has been obtained.

The size of class varies in different localities from 10 to 65, the average class for the seventh grade being 34, and for eighth grade, 27. The usual time spent in recitation per week is 200 minutes with 150 minutes per week given to study in school. There is also some home work given that requires about 30 minutes nightly.

In the eighth grade, the time given to recitation and study are about as shown for seventh grade, and some algebra is often introduced.

Reforms contemplated are, "more oral work," "to apply the work to problems of personal interest to the pupil," "to eliminate the non-essentials and emphasize the essentials," "better work in oral arithmetic," "more drills for thoroughness."

SUBCOMMITTEE 6. PREPARATION OF TEACHERS FOR GRADES 7 AND 8.

In preparing this report the committee attempted to obtain information from both public and private elementary schools in accordance with plan suggested by the American commissioners. Practically no response was received from private schools to which blanks were sent, and hence the report is limited to public elementary schools.

I. PRESENT STATE OF ORGANIZATION.

TEACHERS.

In investigating the present state of organization, the tabulation of elementary schools given by the United States Commissioner of Education in his report for 1908, volume 2, pages 502-517; 596-611, was used. In these tables are listed 531 schools in cities of over 8,000 population, and 670 schools in cities of 4,000 to 8,000 population. The first group is known in the report as Class A and the second as Class B.

Five hundred cities, 250 from each class, were selected for the purposes of the report, each member of the committee selecting 100 from the section assigned to him, 50 from each class. Only graded

schools were chosen, and each State was considered in proportion to the number of its school systems.

In response to a questionnaire sent to the 500 cities, 238 replies were received as follows:

NUMBER OF CITIES REPORTING.

	Class A.	Class B.
North Atlantic.....	29	19
South Atlantic.....	13	11
South Central.....	13	11
North Central.....	64	54
Western.....	13	11

The following tables summarize the information received from the cities:

TABLE 1.—*Teachers.*

	Number in seventh and eighth grades.				Preference of cities as to sex of teachers for seventh and eighth grades.					
	A		B		A			B		
	Men.	Women.	Men.	Women.	Men.	Women.	No preference.	Men.	Women.	No preference.
North Atlantic.....	679	2,642	11	121	11	3	6	7	6	3
South Atlantic.....	41	164	16	37	5	3	1	5	3	.....
South Central.....	40	155	10	36	9	1	2	5	4	.....
North Central.....	192	1,602	55	294	28	17	9	31	7	8
Western.....	35	354	20	69	8	1	1	5	1	1
Total.....	987	4,917	112	559	61	25	19	53	21	12

TABLE 2.—*Preparation of present teaching force in grades 7 and 8.*

	Actual.			Preference by cities.		
	College.	Normal.	High school.	College.	Normal.	High school.
North Atlantic:						
A.....	895	316	953	13	15	.....
B.....	9	90	126	3	16	.....
South Atlantic:						
A.....	48	41	110	11	7	.....
B.....	18	19	41	1	9	.....
South Central:						
A.....	62	52	139	8	3	2
B.....	19	9	31	4	6	2
North Central:						
A.....	115	953	1,727	21	38	.....
B.....	50	111	311	19	31	1
Western:						
A.....	13	121	137	5	7	.....
B.....	21	52	55	4	4	2
Combined:						
A.....	1,133	1,483	3,066	58	70	2
B.....	117	281	564	31	66	5
Total.....	1,250	1,764	3,630	89	136	7

TABLE 3.—*Present requirements of cities as to preparation for teachers of grades 7 and 8.*

	Academic.				Professional training.				Certificate.					
	College.	Normal.	High school.	None.	Two years.	One year.	Experience.	None.	State.	First grade.	Second grade.	City.	None.	Normal school diploma.
North Atlantic:														
A.....	3	12	11	5	15	1	7	4	5	....	1	5	14	2
B.....		5	8	4	10	....	3	5	4	....	....	....	10	2
South Atlantic:														
A.....	2	5	4	4	3	....	3	6	....	7	....	2	1	2
B.....		5	2	....	2	....	4	....	1	6	....	....	....	1
South Central:														
A.....	2	4	5	1	5	1	....	5	4	2	1	4	1	1
B.....	3	2	3	2	1	....	3	4	1	3	2	1	2	....
North Central:														
A.....	3	16	39	11	27	5	14	13	4	21	13	13	7	12
B.....	1	11	22	16	18	6	12	13	6	18	14	2	6	10
Western:														
A.....		4	9	....	10	....	1	....	1	3	6	....	2	....
B.....	1	3	4	....	7	....	1	2	2	2	4	....	1	....
Combined:														
A.....	10	41	68	21	60	7	25	28	14	33	21	24	25	17
B.....	5	26	39	22	38	6	23	24	14	29	20	3	19	13
Total.....	15	67	107	43	98	13	48	52	28	62	41	27	44	30

In New York City the preparation required of men teachers in grades seven and eight is: (1) College course and one to three years' experience; or (2) a normal school course and three years' experience. In addition there is required a promotion license based on, (1) three years' experience; (2) 60 hours' professional course; (3) examination in arithmetic, algebra, and geometry. For women teachers the requirement is (1) normal school course and one years' experience; (2) New York State life certificate and five years' experience; or (3) college course and one years' experience.

In two cities of Class A and three of Class B, men are preferred for the eighth grade and women for the seventh. In New York City men are preferred for teaching boys and women for teaching girls. In Auburn, N. Y., and seven other places reporting, the preference is for an equal division of men and women teachers in the grades in question. There is a general opinion that on the present salary basis women teachers are preferable to the men who are willing to work at present rates of compensation.

COURSE OF STUDY.

The course of study in mathematics for the seventh and eighth grades of the public schools throughout the United States is remarkable for uniformity. In the seventh grade the usual topics are denominate numbers and percentage; in the eighth grade, applications of percentage—discount, insurance, notes, stocks and bonds, etc. These topics are supplemented by review or advance work as time allows. For example, in a typical school we find in the seventh

grade in addition to the topics named above, analysis of problems, ratio, fractions, decimals; in the eighth grade, proportion, powers and roots, longitude and time.

The excellent course of study in mathematics for the public schools of Augusta, Me., says: "Up to this time (seventh grade) the pupil has been, to a large extent, a mere reckoner; he should now become something of an arithmetician. The mathematical mind was a late development in the race, and its growth in the child should not be forced. It is believed, however, that this grade marks the approach of the time when the pupil should pass from mere control and manipulation to understanding and investigation. He may now be asked to define arithmetic, or at least attempt a definition, and should appreciate some of the difficulties of its development.

"No discrimination need be made between algebra and arithmetic, nor between algebraic and arithmetical solutions. Pupils should not feel abashed in the presence of x , but should regard it as a good friend, employ it habitually, and if possible, unconsciously, to represent unknown quantities, and solve the equations containing it entirely as a matter of course."—Course of study in mathematics for the elementary schools, Augusta, Me., 1909

In this connection it is interesting to note that of the 238 cities reporting to the committee 11 of Class A and 7 of Class B teach algebra in the seventh grade, while 47 of Class A and 26 of Class B teach it in the eighth grade. Concrete geometry is taught in the seventh grade of 8 Class A schools and of 3 Class B schools; it is taught in the eighth grade of 10 Class A schools and of 8 Class B schools.

In New York City the consensus of opinion of the large majority of principals is that the inventional geometry and algebra of the seventh and eighth grades should be entirely omitted; that these subjects should be relegated to the high school, and that the time gained should be given to pure arithmetic.

In Chicago the board of education has recently voted to drop algebra and geometry from the seventh and eighth grade courses.

A very few schools reported such unusual features as the correlation of arithmetic, algebra, and geometry, and the segregation of pupils. The department plan is used by 103 schools.

In Class A 99 schools reported the present course satisfactory, while 30 reported the opposite. In Class B 58 schools reported course satisfactory and 39 reported unsatisfactory. As causes of dissatisfaction 83 gave "poor teachers"; 49, "course of study"; 12, "large classes"; 10, "lack of time"; 13, "poor pupils"; 12, "textbooks."

In response to a question relative to the attempts to "humanize mathematics," 68 report "good"; 30, "none"; 27, "doubtful." The effect of manual training is considered "good" by 104. "none" by 9, and "doubtful" by 35.

Among recent improvements, 28 report "none"; 64, "course of study"; 51, "teachers"; 32, "texts"; 3, "salaries"; 9, "department teaching."

II. THE TRAINING OF SEVENTH AND EIGHTH GRADE TEACHERS OF MATHEMATICS.

1. CITY TRAINING SCHOOLS.

Of 132 Class A cities included in this investigation, 29 report city training schools with an attendance of 127 men and 3,222 women. Of this number, 113 men and 2,182 women are reported from the three New York City training schools.

The plan of organization varies from the St. Louis five-year course for high-school graduates to that of a department of the high school. Local conditions govern in this matter. Theory and practice are about evenly balanced in all cases. Academic instruction varies from the first two years of a university course, as in Cincinnati, to none at all in 11 schools reporting.

Fifteen of these training schools give opportunity for practice teaching of mathematics in grades 7 and 8. The longest practice period reported is that of Cambridge, Mass. In that school one year of practice teaching is offered and cadet teachers are paid \$200 to \$250 per year.

Seven city training schools offer courses in the history and teaching of mathematics; one mentions as a special feature a mathematical library.

In response to a question as to the conditions which a rational preparation of teachers for the grades in question should fulfill, replies were received as follows: Massachusetts—(a) normal or college diploma, (b) summer school course at least every third year, (c) membership in local mathematics club, (d) membership in New England Mathematical Association; Virginia—(a) high-school course, (b) good normal course, with practice work; Georgia—(a) teaching knowledge of subject, (b) practice course, (c) rational course in pedagogy; Indiana—inexperienced teachers should not be allowed in seventh or eighth grade work; Iowa—good knowledge of arithmetic, algebra, and geometry; Missouri—more attention to subject matter, but method not neglected. The remaining 23 cities offer no suggestions on the question.

2. UNIVERSITY AND COLLEGE DEPARTMENTS OF EDUCATION.

Sixty university and college departments of education reported as follows: North Atlantic, 7; South Atlantic, 10; South Central, 6; North Central, 32; Western, 5.

Twenty of these schools offer opportunity for general practice teaching in mathematics and 15 give practice in grades 7 and 8 of their training school. Twenty-two offer course in the teaching of mathematics and 16 in the history of the subject. Research work is

done in 13 schools. In the rational preparation of teachers, 35 believe that emphasis should be laid upon subject matter, while 21 would stress method.

In all of these schools students preparing to teach have access to the regular college and university courses in mathematics.

3. STATE NORMAL SCHOOLS.

Reports were received from 88 State normal schools, as follows: North Atlantic, 17; South Atlantic, 5; South Central, 8; North Central, 36; Western, 14.

Seventy of these schools require general practice teaching in mathematics, while 66 require it in grades 7 and 8 of their training schools. Courses in the teaching of mathematics are offered by 52, and courses in the history of mathematics by 14 schools, while 5 give opportunity for research work.

The mathematics course in normal schools varies greatly. The minimum is a high-school course. About one-fourth offer college courses in mathematics. Nearly all of this group are in the North Central and Western States.

4. PRIVATE NORMAL SCHOOLS.

Forty-two private normal schools sent in reports. They were distributed as follows: North Atlantic, 3; South Atlantic, 19; South Central, 8; North Central, 11; Western, 1.

Of this number 28 have practice schools, and 24 give special training in teaching seventh and eighth grade mathematics.

Courses in the teaching of mathematics are offered by 20; in the history of the subject by 4. Two of them give opportunity for research.

In connection with both public and private normal schools, it is a matter of special interest that, contrary to the usual opinion, the majority lay emphasis upon subject matter of mathematics in teacher preparation rather than upon method. Sixty-one would emphasize subject matter, while 22 would lay the emphasis upon method.

5. THE FORWARD MOVEMENT IN NEW YORK.

(a) In New York City in April 1911, the board of education took action requiring all teachers not holders of a grade "A" license to pass an examination before promotion to positions in seventh and eight grades. For the improvement of the teaching of mathematics in grades 7 and 8 the following steps have been taken:

1. Special attention to the subject by many of the district superintendents in principals' conferences and in holding tests for different grades uniform throughout their respective districts.

2. The issuance of an important special circular by the city superintendent indicating the main errors committed in teaching mathematics in the city schools and pointing the way to remedy those errors.

3. The establishment of courses of instruction in the history of mathematics and in methods of teaching elementary mathematics. Some of these courses have been given under the independent auspices of teachers' associations, others have been given in cooperation with local universities, and others have been given independently by local universities.

4. The local teachers' and principals' associations of the Borough of Brooklyn have jointly prepared a carefully devised general teaching plan in mathematics for the purpose of securing desirable uniformity in the sequence of topics in the schools of the borough. This plan is widely used.

(b) In New York State revisions of the graded-school course are in progress, which will very materially affect the work of the next five years. The following extract from the 1910 report of Commissioner Draper indicates the nature of the revisions:

A syllabus covering the first six grades is submitted. * * * It has not been possible nor was it expected that all of the present work of the seventh and eighth grades could be put in the six years' course. * * * The intermediate course covering such grades to round out the elementary course has been prepared. It is in this two years' (seventh and eighth years) course that the elementary work will begin to differentiate. The regular course will lead to the present high-school course. It includes arithmetic, history, English, physiology, modern languages, and other subjects which have previously been considered in academic work. * * * This two years' course also includes work specially adapted to prepare pupils for commercial and industrial courses in high schools and in trade schools.

6. GENERAL OPINIONS CONCERNING THE RATIONAL PREPARATION OF TEACHERS FOR GRADES 7 AND 8.

Some of the general opinions concerning rational preparation of teachers are noted here. They are fairly representative of the whole group.

From a Pennsylvania normal school:

A more complete appreciation of the subject matter, emphasizing its philosophy and the need of absolute accuracy of statement and of result. In addition to this must come an appreciation of the mental activity to which the various phases of the mathematics make their appeal, why this is so, and the means of making this appeal most effectively—this I think of as the pedagogy of mathematics.

From Commissioner Draper's 1910 (New York State) report:

The normal schools are charged with the special duty of training teachers for the elementary schools. * * * The elementary work of the seventh and eighth grades is to be so radically changed under the new syllabus that special provision must be made for training teachers for these grades so that more men will enter this field of teaching.

From a New York State normal school:

(1) It (rational preparation) should give a thorough knowledge of the subject matter of arithmetic; (2) it should emphasize the development of the

subject from the beginning, and the methods of teaching the subject; (3) it should include a discussion of modern movements and modern tendencies, and the consideration of the different classes of material with which the teacher should be provided. * * * The average normal pupil's knowledge of algebra is too limited to enable him to follow any discussion of methods of developing topics in algebra.

A new Jersey State normal school:

Students who come to us from high schools which give the best preparation in mathematics are the best students in methods of teaching arithmetic. Therefore a round course of mathematics before methods of teaching.

Southwest Texas Normal School:

When the entrance requirements are low, nearly if not all the time should be given to the acquisition of subject matter. As entrance requirements are raised, more time should be given to the professional work of the subject.

University of Texas School of Education:

The training of teachers of mathematics for grades 7 and 8 should include these features: (a) Scholarship, including solid geometry, trigonometry, advanced algebra, and some analytics; (b) a course in general method; (c) a course in psychology, including developmental psychology; (d) a course in the history of education; (e) a course in practice teaching.

Washington State Normal School:

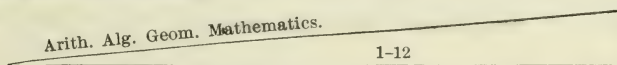
I am inclined to think that more attention should be given to subject matter, but not any less to the method. We have so many "isms" that mathematics is not receiving its just share of time. Most students coming from accredited high schools are weak in the subject matter of arithmetic.

Washington State University department of education:

The great weaknesses of mathematics in the grammar grades are two: (1) The absurd American plan of grinding out complex and almost impossible arithmetic before taking up enlightening and comparatively simple elements of algebra and (plane?) geometry. This is an intolerable fault. Our actual curve of difficulty is this—



when it should be of course—



(2) Mathematics should be more concrete in the grammar school (and I think even in the high school), and (a) more clearly related to the boy's interest, (b) more closely correlated with other subjects.

Montana State Normal College:

We find that it is very difficult in the time we have here to make students satisfactorily reliable in arithmetical subject matter. High-school graduates seem to have lost completely all the knowledge of arithmetic presumed to have

been acquired below the high school, except the little which they use in higher mathematical subjects, and even in that little they are rarely accurate.

Iowa State Teachers' College, President H. H. Seerley:

Mathematics has a proper place from the fourth grade through the twelfth grade, provided it is adapted to the age and development of the pupil. All the arithmetic necessary to be known can be taught in less than a year if given at the proper time of the pupil's development. There is a great waste of time now, as children are treated as if they need adult knowledge. A suitable book on mathematics should be written for the grades below the high school.

CONCLUSION.

The committee has attempted to set forth the present conditions relative to the preparation of teachers of mathematics for grades 7 and 8 of the public elementary schools of the United States. No effort has been made to draw conclusion or to formulate a program for the future.

It is very evident that in proportion to the need there is but little specific preparation for the teaching of seventh and eighth grade mathematics. There is a failure to realize the truth of the statement previously noted that "this (seventh) grade marks the approach of the time when the pupil should pass from mere control and manipulation to understanding and investigation," and to provide the kind of instruction needed to lead the pupil out into the broader field of mathematical knowledge.

The failure of the school authorities to grasp the real meaning of algebra and concrete geometry in the seventh and eighth grades is characteristic of the attitude of the American people toward the public schools. The fear that formal algebra and formal geometry are going to crowd out some more practical subjects is what lies back of such action as that in Chicago. If the necessary general arithmetic and concrete geometry could have been made part of the arithmetic course with no comment upon the relation to the more formal courses of the secondary school, and no introduction of the names by which the later courses are known, possibly the progress toward a more efficient course of study might have been greatly hastened. Only 38 per cent of the cities report any algebra (general arithmetic) in grades 7 and 8 and only 12 per cent report any concrete geometry.

We need in the seventh and eighth grades teachers who have been led to see mathematics as a part of human progress, and who can open the eyes of their pupils to behold the same vision. In the words of President Butler:¹

Mathematics, therefore, studies an aspect of all knowing, and reveals to us the universe as it presents itself, in one form, to mind. To apprehend this, and to be conversant with the higher developments of mathematical reasoning are to have at hand the means of vitalizing all teaching of elementary mathematics.

¹ Introduction to Smith's *The Teaching of Elementary Mathematics*, p. xl.

COMMITTEE NO. II. SPECIAL KINDS OF ELEMENTARY SCHOOLS.

GENERAL REPORT.

The investigations of the committee on the teaching of mathematics in special kinds of elementary schools have been confined to a discussion of the work as it is given in trade and industrial schools. There are other special types of schools, notably those that deal with defectives and delinquents that might be considered under this classification. It seemed best to the committee, however, to confine their attention to the group mentioned above. The work done in the schools for defectives is a modification of that commonly done in other schools by means of methods of instruction suitable to the type of mind dealt with. In schools for delinquents, whether day truant schools, parental schools, or reformatories, the work is quite commonly either the ordinary work in mathematics given in elementary or secondary schools, or such as is considered in that part of this report relating to industrial schools.

In the Bulletin No. 11 of the National Society for the Promotion of Industrial Education there is given a descriptive list of trade and industrial schools in the United States. This bulletin was issued in August, 1910. There were at that time more than 140 such schools about which the society was able to gain information. The classification of these schools is as follows:

1. Intermediate industrial, preparatory trade, or vocational schools.
2. Trade schools: Day courses—(a) supported by public funds; (b) supported by private funds.
3. Technical schools: Day courses—(a) supported by public funds; (b) supported by private funds.
4. Apprenticeship schools.
5. Evening schools: (a) Giving technical courses and supported by public funds; (b) giving technical courses and on private foundation; (c) courses given by Young Men's Christian Associations; (d) giving practical shop courses and supported by public funds; (e) giving practical shop courses and on private foundation.
6. Part-time schools.

7. Trade schools for colored races.

8. Correspondence schools.

All of these different classes of schools can be considered as special kinds of elementary schools as contrasted with the ordinary high school. From another point of view they are secondary schools, since in most cases at least six years of elementary school work is required for entrance, and since the courses of instruction offered lead directly to vocational efficiency. The committee has concerned itself with all of these groups of schools in its report even though they may not have been specified in the outline of work proposed, and may not be specifically mentioned in the later discussion.

Some brief statements of the work of these several classes of schools may not be out of place as a preliminary to the consideration of their work in mathematics. In the statements which follow, the characterization of the catalogue of the National Society for the Promotion of Industrial Education mentioned above is followed, and in some cases the exact wording is quoted.

INTERMEDIATE INDUSTRIAL, PREPARATORY TRADE, OR VOCATIONAL SCHOOLS.

These schools take pupils who are 14 years of age and have completed at least six years of the elementary school course. These children are too young to be accepted as apprentices in the trades, and yet have commonly left school to enter upon occupations which promise very little advancement even after several years of service. "The intermediate industrial school has the double aim of turning the attention of its pupils, and of the parents of pupils, to the superior opportunities for independence offered by work in the manual trades, and of giving them such instruction as will enable them after two or three years to enter the trades with advantage. By this means it is designed to retain for a longer period of time the boys and girls who otherwise leave school."

"In schools of this class, the course of study commonly combines bookwork and shopwork in almost equal proportions. The bookwork generally includes English, shop mathematics, industrial history, and civics, together with the elements of physics and chemistry. The shopwork is usually confined to a limited choice of preparatory trade work for each sex. Beginning with general industrial practice the work is more specialized toward the end of the course and carries the pupil to a point at which he will be able to enter a skilled trade or a factory industry as an apprentice possessing a general knowledge of the quantities involved and a background of scientific knowledge that will open the way for comparatively rapid promotion." Examples of schools of this type are the following: Secondary Industrial School of Columbus, Ga.; New Bedford Industrial School, New Bedford, Mass.; Lawrence Industrial School, Lawrence, Mass.; Newton Inde-

pendent Industrial School, Newton, Mass.; Albany Vocational School, Albany, N. Y.; Hudson Industrial School, Hudson, N. Y.; New York City Vocational School for Boys, One hundred and thirty-eighth Street and Fifth Avenue; Rochester Factory School, Rochester, N. Y.; Rochester Shop School, No. 26, Rochester, N. Y.; Industrial School, Schenectady, N. Y.

TRADE SCHOOLS.

Trade schools which offer day courses are of two distinct types. Some have very short courses like the Baron de Hirsch Trade School, and the New York Trade School, where very little attention is given to instruction in English, mathematics, or science. In these schools the aim is to prepare pupils for actual work in the trades in the shortest possible time. After a course of from four to six months the student can frequently secure employment as a helper, and, because of the work done in school and his knowledge of the theory of the trade, he can commonly advance rapidly to the grade of journeyman. The trade schools giving longer courses frequently give very thorough instructions in English, mathematics, and science. The Williamson Free School of Trades and the Wilmerding School of Industrial Arts devote a considerable proportion of time to such instruction.

The Manhattan Trade School for Girls, recently established in New York City, and similar schools in Boston and in certain other cities, are especially interesting. We have long been accustomed to the idea of trade schools for boys, but have until recently neglected to realize that there is the same necessity for training and instruction for girls. The results already achieved by girls' trade schools prove that, as in the case of boys, the trade school prepares for a type of work in which a living wage is secured and in which there is opportunity for advancement. The list of trade schools given in the bulletin of the National Society for the Promotion of Industrial Education follows:

SUPPORTED BY PUBLIC FUNDS.

The Manhattan Trade School for Girls, New York City; State Trade School, New Britain, Conn.; Worcester Trade School, Worcester, Mass.; Yonkers Trade School, Yonkers, N. Y.; Portland School of Trades, Portland, Oreg.; Philadelphia Trades School, Twelfth and Locust Streets, Philadelphia, Pa.; Milwaukee School of Trades for Boys, Milwaukee, Wis.; Girls' Trade School, 620 Massachusetts Avenue, Boston, Mass.; New York Trade School for Girls, Syracuse, N. Y.; Milwaukee School of Trades for Girls, Eighteenth and Wells Streets, Milwaukee, Wis.

SUPPORTED BY PRIVATE FOUNDATION.

Wilmerding School of Industrial Arts for Boys, San Francisco, Cal.; Winona Technical Institute, Indianapolis, Ind.; David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo.; Paterson Silk Textile Institute, Paterson, N. J.; School of Science and Technology of Pratt Institute, Ryerson Street, Brooklyn, N. Y.;

Baron de Hirsch Trade School, 222 East Sixty-fourth Street, New York, N. Y.; New York Electrical Trade School, 39 West Seventeenth Street, New York, N. Y.; New York Trade School, First Avenue between Sixty-seventh and Sixty-eighth Streets, New York, N. Y.; Girard College, Philadelphia, Pa.; Williamson Free School of Mechanical Trades, Williamson School, Delaware County, Pa.; Miller School, Albemarle County, Va.; Hebrew Technical School for Girls, Second Avenue and Fifteenth Street, New York, N. Y.; Manhattan Trade School for Girls, 209-213 East Twenty-third Street, New York, N. Y.; Ezra F. Bowman Technical School, Lancaster, Pa.; Omaha Watch Repairing, Engraving and Optical Institute, Omaha, Nebr.; Horological Department of Bradley Polytechnic Institute, Peoria, Ill.; College of Horology, Broad and Somerset Streets, Philadelphia, Pa.; St. Louis Watchmaking School, St. Louis, Mo.; Waltham Horological School, Waltham, Mass.; Coyne National Trade School, 1701 N. Ashland Avenue, Chicago, Ill.; Master Plumbers Trade School, St. Louis, Mo.

TECHNICAL SCHOOLS: DAY COURSES.

"The schools included under this classification are of secondary grade and do not give instruction of higher engineering rank. The courses are designed to give the pupil such acquaintance with the scientific and mathematical principles underlying commercial processes as will enable him to qualify in time for the work of foreman, master mechanic, inspector, etc. Special attention is called to the group of textile schools, which are not trade but technical schools, in which both the practical and the theoretical aspects of textile manufacture are presented."

The following schools are supported by public funds: Bradford Durfee Textile School, Fall River, Mass.; Lowell Textile School, Lowell, Mass.; New Bedford Textile School, New Bedford, Mass.; Technical High School, Cleveland, Ohio; Louisiana Industrial Institute, Ruston, La. Supported by private funds: California School of Mechanical Arts, San Francisco, Cal.; Bliss electrical School, Takoma Park, Washington, D. C.; Lewis Institute, Madison and Robey Streets, Chicago, Ill.; Hebrew Technical Institute, 36 Stuyvesant Street, New York, N. Y.; Pratt Institute, Brooklyn, N. Y.; Webb's Academy for Shipbuilders, Fordham Heights, N. Y.; Ohio Mechanics' Institute, Cincinnati, Ohio; Drexel Institute of Art, Science, and Industry, Philadelphia, Pa.; Philadelphia Textile School, Philadelphia, Pa.; Carnegie Technical Schools, Pittsburgh, Pa.; High Schools of Practical Arts for Girls, Boston, Mass.

APPRENTICESHIP SCHOOLS.

Apprenticeship schools are provided by a number of large industrial corporations for the education of boys who are learning their trade. In these schools there is a close correlation of the theoretical instruction and the practical shopwork. Through training in mathematics, drafting, English, and science, there are recruited from the ranks of those who work in the shops a group of

men much more capable than the ordinary worker. Sometimes from this group there are chosen those who occupy the higher supervisory positions. The movement is an indication of the desire of these corporations to supplement the work ordinarily done in the shop during the period of apprenticeship with a type of theoretical work which will develop a more intelligent workman. The fact that in most of these schools shop time is taken for the class work, and that this time is paid for at the regular rate, is an indication of the value attached to such exercises. The following is a partial list of such schools: Apprenticeship System of the New York Central lines; Apprenticeship Schools of the Santa Fe Railroad System; Apprenticeship School of the General Electric Co., West Lynn, Mass.; Yale & Towne Manufacturing Co.'s Apprentice School, Stamford, Conn.; School for Apprentices of the Lakeside Press, Chicago, Ill.; Solvay Process Co.'s Apprentice School, Syracuse, N. Y.; School of Printing of the North End Union, Boston, Mass.; Drawing School of the American Steel & Wire Co., Worcester, Mass.; Fore River Shipbuilding Co.'s Apprentice System, Quincy, Mass.; Ludlow Textile School, Ludlow, Mass.; Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.; John Wanamaker Commercial Institute, New York, N. Y., and Philadelphia, Pa.

EVENING SCHOOLS.

Evening schools are more closely related to the apprenticeship schools than to any other of those already mentioned, since the students are recruited almost wholly from among those who work at the various trades during the day. They are intended to give a type of education, both theoretical and practical, which will give the worker at the trade a better understanding of his work and of its relationship to the industry toward which his work contributes. The tendency of shopwork is to confine the worker to one very small part of the whole industry and hence to give him very little appreciation of the significance of his labor, either in relation to the other processes in the same industry or to the industry in the larger social group. These evening schools, commonly called industrial improvement schools or continuation schools, follow a course of study not unlike the corresponding day schools. The following schools are of this type and give technical courses, and are supported by public funds: The Evening Industrial School, Boston, Mass.; Public Evening Trade School, Lowell, Mass.; Bradford Durfee Textile School, Fall River, Mass.; Lowell Textile School, Lowell, Mass.; New Bedford Textile School, New Bedford, Mass.; Evening Industrial School, Pittsfield, Mass.; Evening School, Little Falls, N. Y.; Stuyvesant Evening Trade School, 345 East Fifteenth Street, New York City; Brooklyn Even-

ing Trade School, Brooklyn, N. Y.; Technical High School, Cleveland, Ohio. Schools giving technical courses and on private foundation are as follows: Lewis Institute, Chicago, Ill.; Franklin Union, Berkeley and Appleton Streets, Boston, Mass.; Lowell Institute School for Industrial Foremen, Boston, Mass.; Technical School, Newark, N. J.; Cooper Union for the Advancement of Science and Art, Astor Place, New York City; Mechanics' Institute, 20 West Forty-fourth Street, New York City; School of Science and Technology of Pratt Institute, Brooklyn, N. Y.; Mechanics' Institute, Rochester, N. Y.; Ohio Mechanics' Institute, Cincinnati, Ohio; Casino Technical Night School, East Pittsburgh, Pa.; Drexel Institute, Philadelphia, Pa.; Franklin Institute Night School, Philadelphia, Pa.; Philadelphia Textile School, Philadelphia, Pa.; Spring Garden Institute, Philadelphia, Pa.; School for Apprentices and Journeymen of the Carnegie Technical Schools, Pittsburgh, Pa.; Virginia Mechanics' Institute, Richmond, Va.

Throughout the United States the Young Men's Christian Associations have entered the field of industrial education. The work of the education department in city, railroad, and industrial Young Men's Christian Associations has become one of the most important of the activities of these organizations during the past few years. According to the report of the National Society for the Promotion of Industrial Education, there are now "2,250 paid teachers who give instruction to over 50,000 employees, men and boys, two nights per week for half the year, in a total of 140 different commercial and vocational subjects. Included in the above lines of class work are mechanical, architectural, and freehand drawing, design, shop mathematics, physics, electricity, chemistry, shopwork in wood and metal, plumbing, etc. This industrial work is not designed to prepare for the higher engineering lines, but on the contrary to furnish opportunities for industrial improvement, either by broadening the pupil's knowledge of a trade or by instructing him in the technical foundations of efficient and intelligent trade work." These associations are scattered throughout the United States. There are more than 60 associations, enrolling 50 or more students in trade and industrial subjects.

Schools giving practical shop courses and supported by public funds are found in the following cities: Cambridge Evening Industrial School, Cambridge, Mass.; Evening School, Chicopee, Mass.; Evening School of Trades, Springfield, Mass.; Long Island City Evening High and Trade School, Long Island City, N. Y.; New York Evening High School for Women, East Forty-second Street, near Third Avenue, New York City.; Stuyvesant Evening Trade School, New York, N. Y.; Philadelphia Trades School, Philadelphia, Pa. The following schools give practical shop courses and on private foundation:

Massachusetts Charitable Mechanic Association Trade School, 111 Huntington Avenue, Boston, Mass.; David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo.; Five Points Italian Trade School, 155 Worth Street, New York City; Hebrew Technical Institute, New York City; New York Electrical Trade School, 39 West Seventeenth Street, New York City; New York Trade School, First Avenue, between Sixty-seventh and Sixty-eighth Streets, New York City; Manhattan Trade School for Girls, 209-213 East Twenty-third Street, New York City; School of Science and Technology of Pratt Institute, Brooklyn, New York City; St. George's Evening Trade School, 505 East Sixteenth Street, New York City; Sixty-third Street Evening Trade School of the Children's Aid Society, New York City; Drexel Institute of Art, Science, and Industry, Philadelphia, Pa.; Hebrew Education Society, Tenth and Carpenter Streets, Philadelphia, Pa.

PART-TIME SCHOOLS.

"The part-time plan, as carried on at Fitchburg, Mass., is an arrangement by which boys in the high school give half of their time to work for wages in the commercial shops in the city and half to school work. Such a plan is designed to furnish the pupil with the theoretical training necessary to his advancement in industrial life, while at the same time providing practical experience and wage return. The school work is under the direction of the board of education of Fitchburg and is supported by public funds. The classroom instruction articulates with the grammar school, and implies regular high-school requirements. For this part of the work the regular school building is used. For the first year the boy devotes his entire time to school work, and for the next three years equal groups of boys alternate weekly between shop and school, so that one group is always at work in the shops and one in the school. On Saturday morning of each week the boy who has been at school for that week goes to the shop in order to become familiar with the work upon which his alternate is working so as to be ready to take it up on Monday morning when the shop boy returns to school. Boys are paid for the work done in the shops at the rate of 10 cents an hour for the first year, 11 cents for the second year, and 12½ cents for the third year, or a total of \$552.75 for the three years." Other part-time schools are found at Beverly, Mass. (The Beverly Industrial School) and at Cincinnati, Ohio (The Cincinnati Continuation School). All of these schools are publicly supported. Doubtless other schools of this type will be open in considerable numbers in the very near future.

TRADE SCHOOLS FOR THE COLORED RACES.

Some of the best industrial work that is done in the United States is to be found in schools for the education of Indians and negroes.

In all of these schools the industrial work is accompanied by literary instruction. In some of the schools as much as half of the time is devoted to industrial training. In some of the schools the relationship between industrial and the ordinary academic work is exceptionally well handled. This is peculiarly true in the subject of mathematics. The problems of the shop and farm are quite commonly treated in the classes in arithmetic, algebra, and geometry. "Normal instruction, instruction in the domestic arts and sciences, and giving each pupil such an understanding of a manual trade or agriculture as will make him financially independent and hence self-respecting—all these features together represent the aim of such schools as Hampton and Tuskegee Institutes and the other institutions in the list." Schools of this class are as follows: Hampton Normal and Agricultural Institute, Hampton, Va.; Tuskegee Normal and Industrial Institute, Tuskegee, Ala.; United States Indian School, Carlisle, Pa.; Christiansburg Industrial Institute, Cambria, Va.; Voorhees Industrial School, Denmark, S. C.; Schofield Normal and Industrial School, Aiken, S. C.; Manassas Industrial School, Manassas, Va.; Mayesville Industrial Institute, Mayesville, S. C.; Okolona Industrial College, Okolona, Miss.; Fessenden Academy and Industrial School, Fessenden, Fla.; Montgomery Industrial School for Girls, Montgomery, Ala.; Colored Industrial and Normal School, Salisbury, Md.; Manual Training and Industrial School for Colored Youth, Bordentown, N. J.

CORRESPONDENCE SCHOOLS.

Many persons who are regularly employed in the industries have sought help through the technical work which is offered by correspondence schools. With the persevering student, they have been able to conduct courses in a very great variety of technical subjects, and have in this way furnished the theoretical background which has made possible a wider outlook and a greater degree of efficiency for those who are regularly employed. The following schools are representative of the best type of this class: American School of Correspondence, Fifty-eighth Street and Drexel Avenue, Chicago, Ill.; International Typographical Union Course in Printing, 130 Sherman Street, Chicago, Ill.; International Correspondence Schools, Scranton, Pa.

The work of these schools is considered in another report to the International Commission on the Teaching of Mathematics.

SUBCOMMITTEE 1. INDUSTRIAL CLASSES IN PUBLIC SCHOOLS.

The subcommittee reporting on industrial classes in public schools included in its inquiry all schools supported and controlled by the municipality through its board of education. There were included, therefore, graded schools having a course of study of from seven to

nine years in length, the technical and manual-training high schools, usually not coeducational, and the ordinary coeducational academic high schools. Evening schools of either elementary or secondary grade, as well as trade schools supported by the municipality as a part of the public-school system, were also considered. The term "industrial classes" was interpreted broadly to mean classes in manual training, domestic art, domestic science in either of the grades or high school, as well as classes in high-school commercial courses. Classes in vocational work in any of the schools named above were also included.

METHOD OF COLLECTING DATA.

A questionnaire was sent to 150 high-school principals and city superintendents in the larger cities of the United States, asking for data on the subject of "Industrial classes in public schools," and the relation of the work of these classes to the work in mathematics. While the response to this questionnaire was not as general or as full as could be desired, yet many superintendents cheerfully responded. It is largely on the basis of these replies that this report has been prepared.

KINDS OF INDUSTRIAL WORK GIVEN IN PUBLIC SCHOOLS.

Industrial work is given in public schools: First, in classes in manual training, domestic art, and domestic science throughout the grades of city school systems; second, in classes in manual training, domestic science, and commercial branches, conducted in the ordinary free academic high schools; third, in technical, manual-training, and commercial high schools; fourth, in evening schools of elementary or secondary grade; fifth, in vacation schools; sixth, in trade schools supported by the municipality and under the control of the board of education. In a few cases vocational classes are maintained in the free academic high schools; and in a very few instances in this country industrial work is given by a cooperation of public schools, and shops and factories. In these cases the boys work part time in the shop or factories and part time in the school.

CULTURAL INDUSTRIAL WORK.

In all parts of the United States a constantly increasing number of public schools have provided instruction in manual training, domestic art, domestic science, and commercial branches. The manual training consisting of whittling and bench work in wood is usually the first form of industrial work to be introduced. The next is sewing and dressmaking, followed by cooking. As public sentiment becomes educated to a more liberal support of this work, it is extended

to all grades below the high school, and also to each year in the high school.

In answer to the question, "What kinds of industrial work are given in your school?" the following reply from one of the large cities in the Middle West is typical: "Strictly speaking, we do not give any industrial work in our public schools unless you would call manual training, domestic art, and domestic science, industrial work. (a) Handwork is taught the children in the first four grades (primary). This handwork consists of two kinds—first, work to illustrate subjects about which they read; second, independent unrelated exercises. In the fifth and sixth grades, boys are taught knife work by a special teacher, and girls sewing. In the fifth grade we give to this work one and one-half hours each week. In the sixth grade two and one-half hours a week. In the seventh and eighth grades boys are taught joinery and cabinetmaking in specially equipped shops; girls are taught cooking. Half a day a week is given to those subjects in the seventh and eighth grades. (b) We are now constructing two manual training high schools which will be ready for occupancy next fall. The manual training in these high schools will not take the form of industrial training, though it may develop into that later. At present in the high schools we have a very complete commercial department which fits pupils for business life and for clerical work. We also teach mechanical drawing, free-hand drawing, and applied design, with some work in the crafts."

From another large city where the high school industrial work was much more extensive, the following reply was received: "In our high schools, sewing, millinery, carpentry, blacksmithing, machine-shop practice, wood turning, architectural drawing, and mechanical drawing are given."

For the most part the lines of industrial education named above furnish the basis for work in the trades rather than direct instruction in the trades.

VOCATIONAL INDUSTRIAL WORK.

Besides the above lines of work there are in some schools strictly vocational classes. Many school boards maintain evening schools of elementary and secondary grade. Much of the work in these schools is vocational. It includes one or more of the following: Millinery, dressmaking, flowermaking, chauffeur's work, wood turning, cabinet-making, architectural drawing, mechanical drawing, stenography, bookkeeping, and other trades of local interest. Of course the high school commercial courses prepare directly for business life and for clerical positions. Trade schools for girls, evening grammar schools, evening high schools, technical high schools, manual training high

schools are forms of schools in which industrial work is prominent. In all of these two kinds of industrial work are carried on—first, that which furnishes a basis for trade or technical instruction, but which is itself not directly trade instruction; second, strictly vocational work.

COOPERATIVE INDUSTRIAL WORK.

A very interesting experiment is being tried in a few cities in this country—the so-called cooperative industrial work. Under this plan boys work one week in the shops or factories and the next week in the public schools. The work in school is such as will directly affect their efficiency in the shop. This plan gives boys their industrial work in the shops and their academic work in school. The academic work is correlated with the shopwork. A number of other cities are planning to try this experiment.

PUBLIC SCHOOL INDUSTRIAL WORK AND LOCAL INDUSTRIES.

Of the cities from which answers to the questionnaire were received very few stated that the work offered in manual training and domestic science is, in any special way, modified to fit the local industries, while several stated that no such relation exists. The following reply is from one of the large cities of the East: "No special attempt has been made * * * in public school work to fit pupils especially for local industries. We have such a variety of local industries that it would be impossible to train especially for certain ones and not for others."

Where evening and trade schools are maintained, a very definite relationship exists between the trades taught and the local industries. Those trades that are carried on in the city where these schools are located are taught in the schools.

ARE PRESENT CONDITIONS SATISFACTORY.

In general, superintendents seem to feel that the industrial work now given is satisfactory as far as it goes. Many express the opinion that more time should be given to the work and greater diversity should be introduced.

The following reply is from a superintendent who has this point of view. He says: "We do not feel that we have really made a beginning in meeting the demand for industrial education. The crowded condition of our schools prevents any advanced steps in this direction. We aim as soon as possible, however, to establish schools which will give greater training along a number of lines of activities."

Another superintendent writes as follows: "Our present industrial work is not satisfactory, if it is thought advisable to give vocational

training. I am not satisfied yet that vocational training should be introduced into public schools. However, I am open to conviction. We are hoping to try a plan of part-day school and part-day work in the shops and in other vocations. If this plan works out satisfactorily it will mean that we will use the shops and factories of the city for the practical work, while the academic and theoretical work will be given in the schools."

Still another superintendent writes: "We want more work of an industrial nature in the schools we have. We want a thoroughly equipped industrial plant in our high school. We want a school that will give students a thorough training in all departments of the silk industry, our leading industry, and its associated occupations, the manufacturing of silk machinery, etc. We should do something for the young men who follow the iron and steel industries, locomotive building, structural-steel work, etc."

THE MATHEMATICAL CURRICULUM.

It is customary to give a course in arithmetic through the grades, beginning in the first or second grade and extending through the eighth. In the eighth grade a course in constructive geometry is given and sometimes one in elementary algebra.

In the academic high schools having four-year courses the customary course in mathematics is given as follows: One year of algebra is required, and this is usually given in the first year of the high-school course; one year of geometry is also required in most high schools. Sometimes it is a year of plane and solid geometry, given, as a rule, in the third year of the high-school course. Sometimes the one-year course is devoted entirely to plane geometry; then it is usually given in the second year of the high-school course. Arithmetic is generally required in the commercial courses, and in some high schools it is required in other courses also. In addition, in the third or fourth year of the high-school courses a half year of advanced algebra and a half year of solid geometry are offered as electives, and then plane geometry only is required.

The following course in mathematics, given in one of the largest high schools in the Middle West, is typical of the work given in schools of this class: In the first year, algebra; in the second year, plane geometry; in the third year, solid geometry and advanced algebra; in the fourth year, trigonometry. The instructor in mathematics in this school writes as follows: "A modification of this course that would possibly be an improvement is the introduction of elementary solid geometry propositions, and trigonometry notions in a first course in geometry, to be given in the second year; the remainder of solid geometry together with the most difficult plane

geometry propositions, to constitute an advanced course, coming in the third year. This would permit of the introduction of a wide range of extremely interesting problem material into the geometry course."

RELATION OF MATHEMATICS TO INDUSTRIAL WORK.

The general tenor of the replies received indicates that a greater effort is being made to correlate mathematics taught in the grades and in the high school with manual training, domestic science, and other industrial work offered in these schools. As a rule in academic high schools, separate classes in industrial mathematics are not conducted. In evening and trade schools, the mathematics offered is taught frequently by the instructor in the trade. In this case, the mathematics taught is such as will be useful in the given trade. Shop formulas are taught; these formulas are applied to practical problems and the meaning of the formulas is made clear. Emphasis is placed, primarily but not exclusively, on the empirical use of the formulas instead of on the demonstrative side as in high-school mathematics. In the Washington Irving High School in New York City, a technical high school for girls, the course in mathematics follows a course made by the domestic art and commercial departments of the school.

The following replies to the questionnaire will indicate in greater detail what is being done along the line of industrial mathematics and the effect industrial work is destined to have on mathematical teaching.

From a large city in the East is the following reply: "Industrial mathematics is taken up in the Technical Evening High School, and in the vocational schools. In each case, separate classes are held for mathematics, but it is correlated as much as possible with shopwork. The demonstrative side is not emphasized particularly, neither are formulas given empirically. Our instructors try to show the reason why and to make the rules and formulas logical deductions. I have no doubt that with the growth of industrial work in the schools a system of shop mathematics will be evolved, beginning with arithmetic and extending certainly through geometry, which will apply particularly to the industries."

Another superintendent writes: "No work in industrial mathematics is given. Use is made of practical problems and applications of mathematics to the arts and sciences because experience has shown that such problems add interest to the work."

A third superintendent in one of the large Western cities says: "There is nothing special in our course of study known as industrial mathematics. I think, however, that there is need for work of this kind. In connection with manual training, mathematics especially

suitable to this kind of work is, of course, used. The same is true in regard to various lines of manual activities offered in the Manual Training High School. There is no doubt that the public school industrial work will tend to make arithmetic, taught in the elementary schools, much simpler and more practical in its character."

A principal of one of the large high schools in the Middle West says: "Shop arithmetic is given with class lectures and work in the shop. Application is emphasized. No attention whatever is paid to demonstration. There is no correlation at present between mathematics and industrial work. In the near future, the mathematical subjects will have to treat their problems and theorems as some part of the world in which we live, and not as something that pupils think exists in imagination. Industrial work will make demands on the pupils which will require them to get their mathematics in organized shape and hold it ready for every emergency."

In a large city in the Middle West the practical side of mathematics in the grades is emphasized by supplying pupils with mimeographed sets of questions and problems such as would arise in buying familiar articles at the meat market, at the grocery department, or at a department store in its various departments. These problems are arranged to bring out the idea of economical buying of articles needed for a meal and of buying articles needed in the various phases of domestic work. Problems are given on the cost of heating and lighting a house by gas and by electricity. In this case, statement is made of the number of feet of gas used, and the number of kilowatts of electricity used, and pupils are required to compute the monthly bill, for these items. Problems are also given relating to the practical work of different industries, such as railroad and foundry problems, pay rolls, cost of house furnishing, etc. Data are given of the amount of money spent by the city in each of the various kinds of city improvements, and the amount of improvement made, for example, the number of miles of street paved in brick, in asphalt, etc. From these data a large number of problems are developed. It is evident that problems of this kind connect directly with the child's home life, with the industrial life, and with the civic life with which he is familiar.

CHANGES NEEDED IN THE MATHEMATICAL CURRICULUM.

The changes needed in the mathematical content and curriculum are along the lines indicated in the foregoing. The principal of one of the largest high schools in New York City says: "The mathematical courses need reformation. What can any sort of mathematics do for the ordinary man, the ordinary woman, the industrial worker, the housekeeper? Get this mathematical desideratum expressed in terms of power and information, and then plan your course in mathe-

matics to produce the outlined purposes. At present the procedure is, 'Every high school has algebra and geometry. We'll have them too.' Neither of these subjects springs out of the needs of the students, nor is it concretely directed toward equipping the students with any useful knowledge or power."

The following quotation sums up the opinion expressed in the large majority of the replies received: "Some of the less essential should be eliminated * * * and more drill given to concrete problems involving home and industrial life."

REQUIRED AND ELECTIVE MATHEMATICS.

The opinion of a large majority of principals and superintendents, answering the questionnaire, is expressed by the following quotation: "Elementary algebra and plane geometry should be required of all. All should have at least this amount of mathematics so as to appreciate the disciplinary and practical value of this branch of human knowledge. Algebra and geometry are essential to a study of the sciences. Higher algebra and solid geometry may with profit be made elective."

The following quotation expresses a more radical view: "If algebra and geometry must come at the beginning of the course, I would make both elective on account of the immaturity of most beginning students. The great modification that I would suggest in high school mathematics would be a shifting of the whole matter at least one year higher in the course, using the first year for language, history, and science subjects."

PROPOSED FUSION OF DIFFERENT BRANCHES OF MATHEMATICS.

The general opinion of those answering the questionnaire is that algebra and geometry should not be fused into one course in mathematics, nor should plane and solid geometry be fused. The following is a typical quotation: "Algebra and geometry should not be fused. By such a plan students will gain very little knowledge of either." Algebra should precede geometry. The step from arithmetic to algebra is much easier than from arithmetic to geometry. Arithmetic and algebra are more closely related. Plane and solid geometry should not be fused.

The opinion is very generally expressed that, while it is undesirable to make the fusions spoken of, a very much closer relationship should exist between the different branches of mathematics offered in the high school.

ORDER OF MATHEMATICAL STUDIES.

The quotations given above and many others of similar nature that could be given, express the prevailing opinion that algebra should

precede demonstrative geometry, though a course in constructive geometry should precede algebra. Plane geometry should precede solid geometry.

THE UTILITARIAN SIDE OF MATHEMATICS IN THE PUBLIC SCHOOLS.

"In what ways is stress placed on the utilitarian side of mathematics?" was one of the questions asked. This is a question to which few satisfactory replies were received. The principal of one of the largest technical high schools in the Middle West says: "Use is made of practical problems and applications of mathematics to the arts and sciences because experience has shown that such problems add interest to the class work."

Another principal says: "In the grades no special stress is placed on the utilitarian side except that we attempt to find worthy concrete problems. In the Manual Training High School shopwork is made the basis of many problems in arithmetic and geometry. The commercial course in the high school aims to be altogether practical."

A superintendent of a large eastern city says: "Commercial arithmetic is studied as a regular subject in the business course, and all work in manual training is from drawings and plans, requiring mathematical computations."

Another superintendent states: "Material for problems in all grades is drawn from home and store and general outside experience. Printed forms, bills, and blanks of various kinds of business are used in the classroom, tax bills, gas bills, etc. Pupils are required to compute the customary discount on these bills."

MATHEMATICS AND APPLIED SCIENCES.

The replies indicate a general tendency to use in the work in mathematics problems from the applied sciences, models, etc., to make the work more effective. The following are quotations from the answers to this phase of the inquiry: "Problems of parallelograms of forces, falling bodies, immersed solids, solids made in the manual training department are used." "Problems in elementary mechanics, cardboard models, and similar devices are used." "Sectional models should be used as foundation work in mensuration in the grades and in the high school. All instruments and machines from which problems are drawn should be, so far as possible, studied, and from these the results should be verified."

CORRELATION OF DIFFERENT LINES OF MATHEMATICS.

Relatively few schools indicate any considerable attempt to correlate the different lines of mathematical work in school. A very large number of schools make no reply to this phase of the inquiry. Some report that no correlation is attempted. A few report that

work along this line is carried on: "Algebraic methods are used in geometry work; algebraic results and formulas are illustrated geometrically; logarithmic computations of volumes is made in solid geometry." "Algebra and geometry, while not taught together, are made interdependent as much as possible."

DRAWING AND GEOMETRY.

Is the fundamental relation between drawing and geometry emphasized? If so, how? To this question few answers were received. The following are some of them: "Yes. In mechanical and architectural drawing." "The course in mechanical drawing, given in the first year, is introduced by the graphical solution of a number of geometric construction problems." "No. The drawing teacher teaches perspective, for instance, which is a direct application of geometry and optics, without any reference to either subject. I doubt if any drawing teacher ever was taught the connection." "The fundamental relation between geometry and drawing is emphasized both in the grades and in the high school, in manual training, in arithmetic, in geometry, and in mechanical drawing." "Very strongly. We give an eight weeks' course in preliminary geometry, and insist on accurate drawings all the time." "Mechanical drawing is applied geometry, and its relations are made use of perforce in all mechanical drawing and drafting for industrial work." These quotations serve to illustrate that in spite of some divergence in opinion the importance of this phase of the work is coming to be recognized in schoolroom practice.

EDUCATIONAL MUSEUMS.

Very few of the cities heard from report that they are equipped with a mathematical museum. Very many of those who replied indicate a belief in the value of such a museum, as the following quotations show: "Undoubtedly a collection of models, instruments, pictures, etc., would be of great value." "We believe it has some value, but it is not essential." "It is too bad that we have not such a museum." "Illustrative material is always of value. It stimulates interest and self-activity." Occasionally a pessimistic note is heard as the following: "I never saw an educational museum that was worth anything, chiefly because it was so administered that the teachers would not take the trouble to use it."

CONCLUSION.

These replies, which were received from cities in all parts of the United States, indicate a strong tendency to increase the amount and variety of industrial work offered in public schools.

Where trades are taught instruction in shop mathematics is given usually by the instructor in the trades. The work as given in these classes in shop mathematics is adapted directly to the trades taught. In the regular mathematical work in the public schools no great change in the mathematical curriculum is demanded.

The effect of the industrial work is, therefore, to introduce into all lines of public-school mathematics a larger number of problems related to the industrial work done in school, to the industries carried on in the community, to the actual life of the child and his home, and to the civic enterprise of the city.

SUBCOMMITTEE 2. CORPORATION INDUSTRIAL SCHOOLS.

In corporation industrial schools the type of work done in mathematics varies with the demand for mathematical knowledge in the work carried on by the corporation. In one school, as, for example, the John Wanamaker Commercial Institute, the work will consist mainly of commercial arithmetic. In another school the mathematical curriculum will extend to a knowledge of algebra, geometry, and possibly trigonometry because of the need for understanding formulæ which must be applied in machine shops. In these schools, as has been suggested above in the discussion of apprenticeship schools, there are found boys who have had from six to eight years of elementary school work, with an occasional boy who may have had some work in high school. With this rather meager equipment, and with the large need for mathematical knowledge which must be applied to shopwork, it becomes apparent that the problem of the shop school is largely one of getting before the class problems which deal with actual shop conditions and teachers who understand shopwork, as well as theoretical mathematics.

Our standard textbooks deal with mathematics in a general way, covering many subjects which have no connection with manufacturing industries. This being the case we can not use the existing textbooks for problem work, and therefore it falls upon the instructor to write the problems required. These problems must, of course, follow in order the usual textbook classification. Since each kind of industry requires problems adapted to its production, no one book can provide problems for all industries requiring trade knowledge. However, one textbook can cover sufficiently the industries representing the manufacture of machinery, engines, and electrical equipment.

The problems must not only follow textbook classification, but they must be in fact what they purport to be, namely, shop problems. In the writing of these problems it is absolutely necessary that the

instructor should be a man who has had shop experience and one who is familiar with the various departments and in touch with factory conditions.

These problems will involve not only a knowledge of the machines in use but an intimate knowledge of the factory production, stock departments, and piecework rates. This knowledge is necessary because the shop boy is quick to note an error in dealing with factory work, and he is equally quick to lose confidence in the instructor who shows a lack of shop experience.

The work in arithmetic, algebra, geometry, and trigonometry in schools of this type is not sharply differentiated as in the ordinary school. In order to indicate something of the nature of the relationship which exists among these subjects, as well as to give some idea of the subject matter covered and the method of instruction, the program of work carried out under the direction of Maj. A. W. Lowe, superintendent of educational classes for the General Electric Co., West Lynn, Mass., is given in the following pages:

ARITHMETIC.

Having written the problems, the next step is to have the apprentices work out the values. One method of teaching the above subject is to have the problem given in the usual way; then substitute literal values for the numerical values previously given and put the problem in the form of an algebraic statement; then substitute a set of numerical values for the literal quantities and solve the problem.

I give herewith specimen examples:

Problem 1. Brass castings are worth 23.25 cents per pound; cast-iron castings, 3.75 cents per pound; malleable-iron castings 4.68 cents per pound. During one week 5,980 pounds of malleable-iron castings, 8,760 pounds of brass castings, and 21,900 pounds of cast-iron castings were shipped. What was the value of the castings sent out?

Problem 2. Brass castings are worth (a) cents per pound; cast-iron castings, (b) cents per pound; malleable-iron castings, (c) cents per pound. During one week (d) pounds of malleable-iron castings, (e) pounds of brass castings, and (f) pounds of cast-iron castings were shipped. What was the value of the castings sent out?

Problem 3. Using the literal quantities of problem 2, let (a) = 27.5, (b) = 3.8, (c) = 4.38, (d) = 6,830, (e) = 7,240, and (f) = 2,250. What was the value of the castings sent out?

Problem 4. With a good quantity of coal the average coal consumption is $1\frac{3}{4}$ pounds per indicated horsepower per hour for a 1,400 H. P. triple-expansion engine running condensing. How long will it take to consume 250 tons of coal, providing the engine averages a $14\frac{1}{2}$ -hour run for each 24 hours?

Problem 5. With a good quantity of coal the consumption is (a) pounds per indicated horsepower per hour for a (b) H. P. triple-expansion engine running condensing. How long will it take to consume (c) tons of coal, provided the engine averages a $16\frac{1}{2}$ -hour run for each 24 hours?

Problem 6. In problem 5 let (a) = $1\frac{3}{4}$ pounds, (b) = 1,250 H. P., and (c) = 135 tons. How long will the supply of fuel last?

It is an excellent method of introducing to the apprentice the first steps in algebra, and my experience shows that the boy by this method grasps the idea of algebra much more quickly than by the usual "cut and dried" methods.

ALGEBRA.

A portion of the arithmetic class period should be set apart for the study of elementary algebra.

It may be argued by some that the study of algebra is not necessary in an industrial education. To such I will say that the study of algebra is necessary to a proper understanding of the formulæ which the boy will be called upon to use in his later work.

In the teaching of this subject great care must be exercised by the instructor in that his explanation of elementary principles must be so clear and concise as to enable the boy to understand the very foundation of algebra. Much attention is given to the use of the formula and the simple equation.

PLANE GEOMETRY.

In the teaching of plane geometry we give the boy instruction relating to the line, and plane figures. He is held to a rigorous explanation of the theorem and the class is not allowed to pass to the next theorem until the one under discussion is thoroughly understood. Wherever possible, the attention of the boy is called to a practical application of the principle involved. This arouses the interest of the boy, for the subject then has a meaning and its application is tangible and not imaginary.

In connection with the geometry the subject of mensuration is taught. In problems involving weight the boy first calculates the weight and then checks this calculation by weighing the article.

If there be a difference in the two results then the boy must prove whether or not the calculation is correct. He finally decides that the error is due to his mistakes in the calculation. With the area of a plane surface a similar method is followed and the boy must measure the surface and compare the result with his calculated area.

A few specimen problems are given below:

Problem 1. A cylindrical oil tank is to be made 30 inches in diameter and long enough to hold 200 gallons. Find the length.

Problem 2. The handwheel of a rheostat is $5\frac{1}{2}$ inches inside diameter and $7\frac{1}{2}$ inches outside diameter and cross section 1 inch in diameter. The hub is $1\frac{1}{2}$ inches in diameter by $1\frac{1}{4}$ inches long and the bore is one-half inch in diameter; connecting the hub and hand part are 4 spokes each one-half inch in diameter. Find the weight, if made of C. I.

Problem 3. The concentric diffuser of an arc lamp is conical shape, 40 inches in diameter and 8 inches high. If the upper rays of light strike the surface 6 inches from the base, find the amount of reflecting surface used.

Problem 4. One part of a friction brake is of the shape of the frustum of a cone. The outer surface of the frustum is 8 inches in diameter and the top is 6 inches in diameter; the height is $1\frac{1}{2}$ inches. What is the angle at the center for the development of the leather, and what is the radius for the base and for the top?

TRIGONOMETRY.

This ends the subject of mathematics as pure mathematics. It has been proven repeatedly in shopwork that a working knowledge of trigonometry is one of the most valuable assets a shopman can possess. On large, and some-

times small, layout work a knowledge of this subject is absolutely necessary, for oftentimes an exact dimension must be given and the work must be finished to that dimension.

Our boys are given instruction in trigonometry through the solution of the oblique triangle. Not all the examples or problems are given to the class, but enough are given to enable the boy to handle any problem which he will be called upon to solve in the execution of his shopwork.

He is given thorough instruction in the fundamental principles of the subject, and his knowledge of these principles is thoroughly tested.

A few specimen problems are given below:

Problem 1. Three holes are so located on a casting that the lines connecting their centers form a right triangle. A is an acute angle of 28 degrees and the hypotenuse (c) is 11 inches. Find the sides a and b.

Problem 2. A cast-steel exhaust flange is 26 inches in diameter, is $1\frac{1}{2}$ inches thick, and has 8 bolt holes nine-sixteenths inch in diameter and exhaust opening 6 inches in diameter. What is the surface area? What is the weight? What is the distance between the centers of any two consecutive bolt holes? If one-eighth inch was allowed for machining, what is the original weight of the casting?

Throughout such a course as is outlined above, the real test of the boy's knowledge of his theoretical work is found in his ability to apply the principles supposedly mastered, to what are usually termed practical problems. In the work at West Lynn the boy's knowledge of mathematics is applied to mechanics, power of transmission, strength of materials, calculating machine parts, magnetism, and electricity.

Mr. Gardner, of the School for Apprentices of the New York Central Lines, characterizes their work in the following language:

Stress is laid upon the practical and commercial side of the mathematical instruction. Every example is clothed in the language of the shops and is illustrated by actual practice in the boy's daily work. For example, the boy learns ratio and proportion by figuring the change gears for cutting different screws in his lathe, and the principles of leverage are demonstrated by the throttle and reverse lever on the locomotive and the brake rigging on the car. No attempt is made to teach subjects promoting general culture. The system is not philanthropic, but is a hard and fast business proposition firmly fixed upon a paying basis.

Things are not taught that are interesting to the teacher, but those that are useful to the student. The apprentice needs a working knowledge of elementary mathematics, but the vital point is that it should be elementary and that it must be a working knowledge. The problems are not regarded as affording a complete program of study in itself, but always form part of a regular course planned in accordance with the trade the boy is following.

Arithmetic, algebra, geometry, physics, and practical mechanics are fused so completely that the student knows no study by any name but arithmetic. It has not been found expedient for skilled mechanics in railroad service to acquire a knowledge of higher mathematics.

All conventional limits between all branches of mathematics are suppressed. Mathematics is taught by lesson sheets. Each boy takes two sheets of problems home per week, each sheet containing an average of seven problems. In the

classroom and laboratory two sheets of practical problems capable of actual demonstration are finished per week. Bright boys may do as many more at home or in the classroom as they wish.

The boy is taught by the instructor and his assistant, and is not told how to do examples, but is asked how to do them. Groups of boys are instructed in the laboratory by the shop or classroom instructor. Instruction is very informal, and friendly discussions are encouraged between the boys and the teacher, consistent with order and discipline.

Leverage models for problems in all classes of levers, racks containing gears, and lathes for studying the properties of gearing, wheel and axle model, pulley blocks, inclined plane, screw jack, etc., are used. A small upright engine is used in the laboratory for teaching valve setting. Models of the Stephenson and Walschaert valve gears are studied and small scale models of engine wheels and frames are employed for teaching boys the practical way of laying out keyways for axles and eccentrics and for setting the shoes and wedges which are used in the main driving-wheel journals of locomotives. A small tension and compression machine is used for a course in strength of materials.

Sample sheets of home problems used in the apprenticeship schools of the New York Central lines follow:

If a raise of pay of 10 per cent is made in a man's wages it means that one-tenth of the present amount will be added to it. If his rate is \$2.50 a day one-tenth of this is 25 cents, and his new rate is \$2.75.

Suppose now our man getting \$2.75 a day was cut 10 per cent; what would he receive? $2.75 + 10/100 = 0.275$, and $\$2.75 - 0.275 = \$2.47\frac{1}{2}$, which is less than he got in the first place before he was raised 10 per cent. We thus see that a 10 per cent raise is less in amount than a 10 per cent cut. This is because our base for the cut is a larger sum than the base for the raise.

When we say an engine or motor is 85 per cent efficient, we mean that we are getting 85 parts of work out of a possible 100. When we say a certain quantity of coal contains 65 per cent carbon and 1 per cent sulphur, we mean that 65/100 of any amount of this coal is carbon and 1/100 is sulphur. We do not mean that 65 pounds are carbon and 1 pound is sulphur.

RATIO AND PROPORTION.

1. If a planer has a cutting speed of 30 feet per minute and a return speed of 147 feet per minute, what is the ratio of the cutting speed to the return speed?

2. What ratio is the area of the steam port to that of the exhaust port on an engine having a steam port of 24 square inches and an exhaust port of 36 square inches?

3. The dead load of a 50-ton freight car, consisting of the weight of the car empty and the trucks, is 42,600 pounds. The live load, or the weight of the freight carried, is 108,000 pounds. What is the ratio of the live to the dead load?

4. If the car in the above problem had only carried 37,400 pounds of freight, what would have been the ratio of the live to the dead load?

5. What is the ratio of the dead to the live load in a passenger coach where the car and trucks weigh 90,450 pounds, and the passengers weigh 4,500 pounds?

6. On a 36-inch planer the ratio of the cutting speed to the return speed of the table is 1 to 2.94. With a return speed of 50 feet per minute, what is the cutting speed?

BOILERMAKER'S HOME PROBLEMS.

1. How much will it take to shear a three-fourth inch steel rivet if the shearing strength of the steel is rated at 45,000 pounds per square inch?

2. The tensile strength of boiler plate is 55,000 pounds per square inch. How many pounds would it take to pull apart a piece of plate 24 inches wide by three-fourths inch thick?

3. Two one-half inch plates A and B (fig. 27) are joined by two 1-inch rivets in a single-riveted lap joint. Suppose the plates were pulled part, the plate B tearing between the rivets on the line X X X. If the tensile strength of the

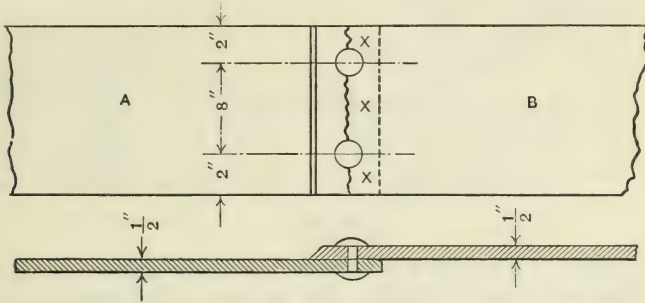


FIG. 27.

plate is 55,000 pounds per square inch, what was the pull in pounds which tore the plate?

4. With the same plates as in the last problem, what pull would tear the plate if the rivets were three-fourth inch instead of 1 inch?

5. If the shearing strength of the rivet iron (fig. 27) is 45,000 pounds per square inch, how much would the two 1-inch rivets stand before they would be sheared off? How much would it take to shear them if they were only three-fourth inch in diameter?

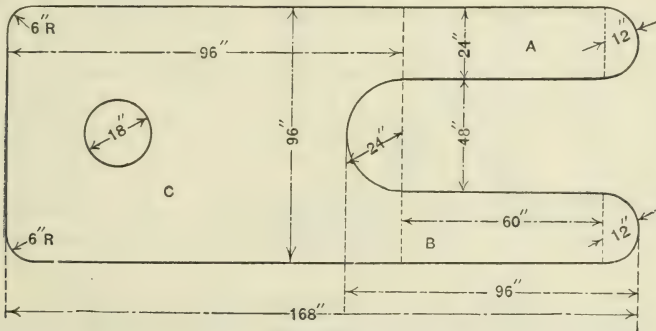


FIG. 28.

6. In the joint shown in fig. 27, if the rivets are 1 inch diameter and the plate one-half inch thick, which will give way first, the rivets or the plate?

GENERAL CLASSROOM PROBLEMS.

Fig. 28 shows the top sheet of a tank made of one-fourth inch steel plate. Divide the figure into 3 rectangles, as shown by the dotted lines. Use Machine Shop Arithmetic, page 137, for all circular areas.

Find area of rectangle A in square inches; find area of rectangle B in square inches; find area of rectangle C in square inches; find area of manhole in square inches; find area of 24-inch half circle in square inches; find area of two 12-inch half circles in square inches; find area of two 6-inch corners in square inches; subtract the two corners, the 24-inch semicircle and the manhole from rectangle C, then add this area to A and B and then add to these the 24-inch circle made by the ends of the two legs; what is area of finished plate in square inches; what is area of finished plate in square feet; what is weight of finished plate in pounds?

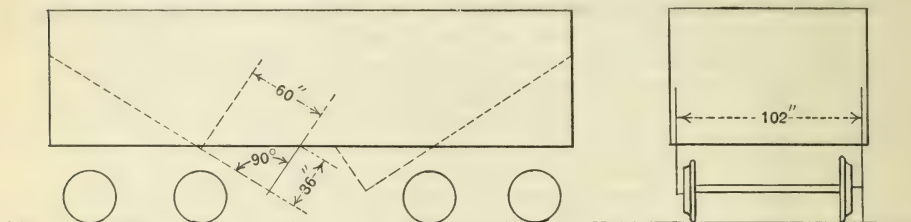


FIG. 29.

Find the weight of coal which is contained in the two hoppers of the hopper-bottom gondola car shown in Fig. 29. Find the area of the triangular end of one hopper and multiply this by the length of the hopper. The shape of the hopper is a triangular prism.

Remember that 1,728 cubic inches make 1 cubic foot and that 1 cubic foot of coal weighs 45 pounds.

Consider the top side of the hopper to be flush with the floor of the car.

Area of two triangular ends, square inches; volume of two hoppers, cubic inches; volume of two hoppers, cubic feet; weight of coal in two hoppers, pounds.

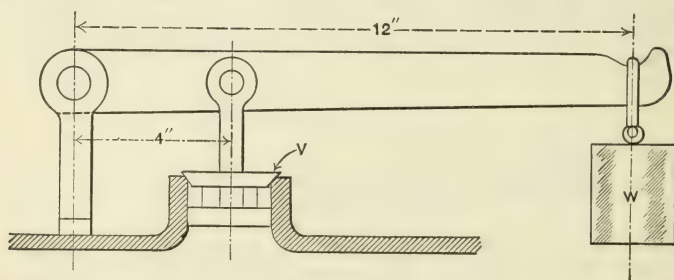


FIG. 30.

In all leverage problems the first and most important thing is to find and locate the fulcrum. The fulcrum is the point which determines the moment arms from which we get the required answer.

The moment arm is always the distance from the fulcrum to the force or weight.

1. A safety valve V on a stationary boiler is loaded with a 50-pound weight at W. (Fig. 30.) Find the total steam pressure on V necessary to open the valve.

2. If the weight was changed to 75 pounds and the distance from the center line of the valve to the fulcrum was made 3 inches, how much steam pressure would it take to open the valve?

3. A stationary boiler is to carry 50 pounds per square inch steam pressure. The safety valve is 2 inches in diameter. If the lever is designed as in Fig. 30, how heavy a weight must be used? Give answer to nearest even pound.

4. What class of lever is shown by Fig. 30.

1. Fig. 31 shows a tender-brake rigging operated by an 8 by 12 inch air cylinder. If the piston moves 8 inches, how far will the push rod move?

2. Draw the similar triangle diagram for problem 1 on the blackboard and mark plainly all dimensions and distances moved.

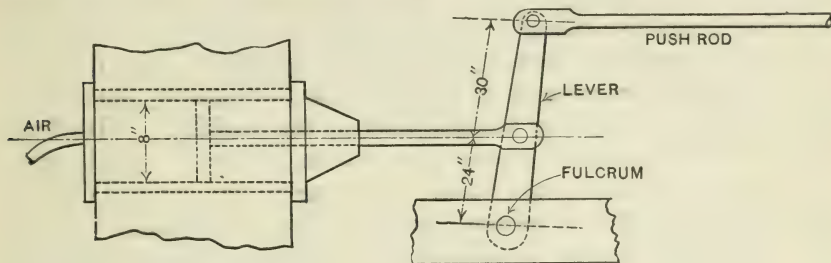


FIG. 31.

3. If the air pressure in the brake cylinder was 90 pounds per square inch, what would be the force transmitted by the push rod?

Fig. 32 shows an air hoist using a regular shop tackle with two pulleys in the lower, or movable, block and two in the upper block. The loose end of the rope is fastened to the upper block. This arrangement is useful when it is necessary to have a good deal of power with a low lift.

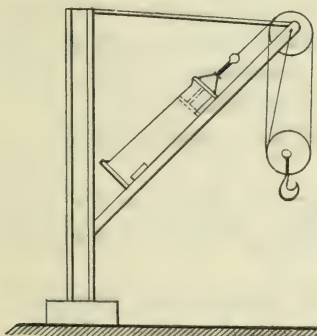


FIG. 32.

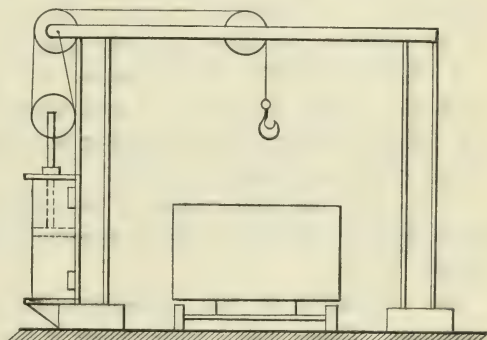


FIG. 33.

1. If the total lift required for the hoist shown in Fig. 33 is 3 feet and the heaviest casting weighs 12,000 pounds, what length of cylinder would we need, allowing 2 inches additional for clearance?

2. In the above problem, what power must we have on the piston?

3. The hoist shown in Fig. 33 has three pulleys—one on the piston rod and two on the structure. If it is required to lift a maximum load of 9,000 pounds with an available air pressure of 80 pounds per square inch, what size cylinder should be used? Give answer to nearest even inch.

**SUBCOMMITTEE 3. PREPARATION OF TEACHERS OF MATHEMATICS
FOR TRADE AND INDUSTRIAL SCHOOLS.**

The committee charged with the investigation of the preparation of teachers consider the character of the preparation which teachers of mathematics have had who are now employed in trade schools or in schools which emphasize the practical element, and also the changes in preparation for this work which are desirable, and how such changes may be brought about. As a preliminary to the two main inquiries it was also thought to be desirable to investigate briefly the status of mathematics teaching in practical schools in order to determine the relative importance of the subject as indicated by the amount of time given to it and by the character of the teaching. With these objects in view about 25 schools were chosen, located in widely separated sections of the United States, including all the day and evening trade schools, public or private, known to the investigator, and also about the same number of technical or industrial schools having a more general vocational aim; and to these were sent the following questionnaire:

1. Is mathematics taught at all in your school? If so, kindly indicate the extent in hours per year (*a*) of theoretical mathematics; (*b*) of applied mathematics.

2. Is mathematics in your school taught by one or more specialists in that subject, by a teacher of other subjects, or by both classes of teachers? (*a*) Number of special teachers of mathematics; (*b*) number of teachers of other subjects who give mathematical instruction.

3. Outline briefly the character of the preparation which your teachers of mathematics have had, whether specialists or not.

4. What facilities for preparing teachers of mathematics for trade-school work are known to you?

5. Do you feel the necessity of extending the facilities for such preparation; and if so, what recommendations would you make in regard to it?

The responses to this questionnaire were prompt and generally complete. There was a wide range in the statistical replies called for in the first two questions, as might be expected from the varied character of the schools to which the questionnaire was sent. There would be no value in tabulating these returns. The significant facts determined were that nearly all the schools give some instruction in theoretical mathematics, only two reporting "no instruction," and all reported that they give some instruction in applied mathematics. The greatest number of hours of instruction in theoretical mathematics is 440 hours per year and in applied mathematics 988 hours per year. This is so far in excess of the average that it seemed somewhat abnormal. These figures were reported by the director of a

trade school connected with a certain large manufacturing interest. Aside from this extreme example the average time devoted to theoretical mathematics may be said to be about 300 hours covering a period of one and one-half years, while the average time devoted to applied mathematics is 210 hours covering about the same time. Several of the reports, however, recognize no distinction between the theoretical and the applied mathematics, but give the average amount of time to the subject as a whole. There is some reason in this view of the case, inasmuch as theoretical mathematics should be, and presumably is, taught in practical schools not for mental discipline, but for its utility as a necessary part of the equipment of the worker in a shop or factory. It is, in fact, very difficult to draw the line between theoretical mathematics taught with a practical aim and applied mathematics.

The replies to the second question indicated that about the same number of special teachers of mathematics are employed as those who teach mathematics as a part of their work. The reports indicate, however, a tendency in the direction of the employment of special teachers. In all large schools the special teacher is the rule, though one large industrial school reported only 3 special teachers of mathematics and 13 who teach other subjects as well. This is evidently an exceptional instance. Most of the schools reporting a mixed program for teachers of mathematics were small schools in which such a policy is a manifest necessity. There seemed to be recognition of the idea that mathematics teaching, to be most effective, should be in the hands of special teachers trained by study and by experience for this work.

Turning now to the first of the two main points of our inquiry viz, the character of the preparation which teachers of mathematics in practical schools have had, the reports indicate that college graduates and graduates of engineering schools largely predominate, though in a few instances the highest training was received in normal schools. It should be said, however, that all the reports emphasized the fact that, in the selection of teachers, much weight was given to practical experience in the shop or drafting room as a necessary element in the training of teachers of mathematics in practical schools. Such training is manifestly essential to effective work in applied mathematics. Speaking of the teachers of applied mathematics, the director of the School of Industrial Foremen in Boston says: "They are teachers of many years' experience in mechanical and electrical engineering subjects, but have not specialized in mathematical work. Such teachers are much better able to get the point of view of men carrying on work in the drafting room, shop, or factory than is possible for a teacher whose experience is limited to mathematical instruction pure and simple." This quotation fairly

represents the general tone of all the reports on this point. College graduates who are teachers of experience are effective in teaching theoretical mathematics; but in order to present the subject of applied mathematics effectively much actual shop experience is essential. This thought was well expressed in one of the papers by the director of the industrial classes in Fitchburg, Mass., in recommending preparation in the "best possible technical schools with 5 or 10 years' shop experience as apprentice or journeyman." But, ideal as such preparation may be, it will be recognized as a very difficult thing to accomplish in any large way. Certainly the number of teachers of mathematics, even in practical schools, who have received such training must be relatively small. With very few exceptions the answer to the fourth question—viz, What facilities for preparing teachers of mathematics for trade-school work are known to you?—was "None at all."

Passing to the second main point of inquiry—viz, What changes in the present order of preparation for the practical teaching of mathematics are desirable?—the trend of the replies was in favor of extending such scientific and practical training as engineering courses and shop experience can afford. No director of industrial or trade schools seems to feel that special school facilities for preparing teachers of mathematics for trade-school work would be desirable or indeed possible. One director writes that a course in practical mathematics with a view to teaching "should be given in engineering courses in technical colleges," and another says that it seems best that no special facilities to develop teachers of practical mathematics should be provided, but rather that the effort should be made to develop in engineering schools teachers who have a realizing sense of the importance of applied mathematics and who should further perfect themselves for teaching by actual experience in the solution of practical problems as they arise from time to time in actual shop-work.

Finally, this report may be summarized as follows: There are at present no special facilities for training teachers of mathematics for trade schools. Such teachers now find their best preparation, after the necessary theoretical groundwork, in several years of actual experience in applying mathematics to the problems of the shop and drafting room. This practical experience is considered to be of such importance that it does not seem desirable, from the present point of view of those who have had experience in directing trade-school work, to encourage special school training to develop teachers of mathematics for trade schools.

It is only fair to suggest that in some of our normal schools the kind of training which is given in mathematics will do much to equip teachers for work in industrial and trade schools. This is especially

true in schools in which much attention is given in the industrial arts. Not infrequently the teacher in training will have the opportunity to teach mathematics to students who are engaged in work in the household and industrial arts, and the demand will be made that problems growing out of their shopwork be used in the mathematics classes. Such training will not, of course, take the place of actual shop experience upon the part of the teacher, but we may expect that students who have had such experience will at least appreciate the need for knowledge of the work done in shops.

To the student of the elementary school curriculum these investigations concerning the type of work demanded in mathematics for special classes of children will be suggestive in the reorganization of the whole curriculum for special groups of children. It is undoubtedly true that in all subjects the tendency has been to provide a uniform course of study which takes little account of the lack of ability on the part of those who quit school and start to work because of the lack of interest in the school program. On the other hand, the school has made little or no provision for children of superior ability. If it is true that the curriculum all along the line needs to be differentiated in at least the last two years of the elementary school course to meet the needs of those who are to go into the industries, it is none the less true that special provision should be made for exceptionally capable children which will result in the saving of time in their preparation for their later work in college or technical schools. This investigation in the teaching of mathematics will, therefore, it seems, not only be significant in giving information to those who plan to organize work in this field, but it will also point the way for a reorganization which is demanded in other subjects.

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PROVISION FOR EXCEPTIONAL CHILDREN IN PUBLIC SCHOOLS

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, October 2, 1911.

SIR: There are many children in attendance upon the public schools of our country who, for one reason or another, can not work most satisfactorily to themselves or others when classified with the great majority of the children. School authorities have seen for many years that the presence of such children in the regular classes is detrimental to the progress of both the exceptional and the non-exceptional. In the manuscript entitled "Provision for Exceptional Children in Public Schools," herewith transmitted, Supt. J. H. Van Sickle, of Springfield, Mass., Dr. Lightner Witmer, Director of the Psychological Laboratory and Clinic of the University of Pennsylvania, and Dr. Leonard P. Ayres, Associate Director, Department of Child Hygiene, Russell Sage Foundation, have set forth the results of their investigations and their suggestions and recommendations to the public-school workers of our country in regard to the educational care these children need. In addition to the detailed discussions relating thereto, extended information concerning the number of cities in our country attempting to meet the problems suggested is furnished in tabular form. The authors have tentatively classified those children who need this special care in public schools into ten groups. Some enter late and need help to make up their work; others are exceptionally talented and should be allowed to make as rapid progress as consistent with thoroughness; others enter speaking only a foreign language and at first need special and almost exclusive drill in English; still others are slow, backward, or defective in one way or another, but not to such a degree as to require the care of public institutions for the defective classes. It is a valuable piece of work and will be of much help to all who are seeking for more effective and just classification of public-school children.

I accordingly recommend the publication of these results as a bulletin of the Bureau of Education.

Very respectfully,

P. P. CLAXTON,
Commissioner.

The SECRETARY OF THE INTERIOR.

PROVISION FOR EXCEPTIONAL CHILDREN IN PUBLIC SCHOOLS.

CHAPTER I.

THE DISCOVERY OF THE EXCEPTIONAL CHILD.

THE SOCIALIZATION OF PUBLIC-SCHOOL WORK AND THE INDIVIDUALIZATION OF THE CHILD.

The progress of educational work in the last 20 years furnishes an impressive display of social functions assumed by the schools of this and other countries. Medical school inspection, school feeding, school nurses, and special classes for truants, physical defectives, and backward children are all separate evidences of a single movement looking toward the socialization of public-school instruction and involving the public-school authorities in the direct responsibility for most of the child's life and development.

On the one hand, education is becoming socialized and is giving increasing recognition to community interests. On the other hand, it has resulted, in respect to the children, in a greater individualization. Education is primarily concerned with the task of transmitting from one generation to the next the intellectual traditions and the moral standards which have been acquired by the race. The eye of the teacher, therefore, is mainly directed to the subject matter of instruction, or to the code of morals and manners which it is desired to impress upon the child. This is as it should be. All efficient work is accomplished only through concentration of attention and through the direction of effort toward a single result. The public school must never give up as its chief function the teaching and training of children in relatively large groups, by teachers who are impressed with the importance of the subject matter of instruction, and who look upon the class as a fairly homogeneous unit.

Nevertheless, provision must also be made within the modern public school for training many children not as members of a group, but as individual or exceptional children. The social purpose of this kind of individualized educational treatment may be considered the keynote of our American civilization. Children are not born equal, nor can we ever thrust equality upon them; but American education can see to it that every child has a fair opportunity to

develop the mental capacities with which it is endowed at birth. The public schools may eliminate in large measure the accidents of social and financial position and the circumstances of the child's individual history as determining factors in its career. Every child should reach adult age with his brains developed to the full measure of their efficiency. This is recommended not merely out of sympathy for the child, but also because the community needs every bit of brain power available, whether this brain power appears in the family of a Pennsylvania miner, a New England farmer, or a Pittsburgh millionaire. Anything less than this spells retarded or arrested development. The highly gifted child can be as much retarded by the circumstances of his life history or by the school system as is the congenitally dull or mentally defective child. This bulletin is conceived as having the purpose of making available some facts and considerations which it is believed should determine the public-school treatment of the exceptional child.

What is normal, even what is supernormal, often fails to arouse attention. The abnormal, the pathological, the deficient, and the defective—these first win the attention of society. Among primitive races this attention is accompanied by feelings of horror, even of terror, and the abnormal are sometimes eliminated by violent means. Next, they are segregated, under the spur of a philanthropic impulse, and are supported in institutions, or they are retained under merely custodial care. This segregation is partly for the benefit of society, and only partly for the purpose of taking care of society's helpless members. It is relatively late in the history of the world that the discovery is made that the training of certain groups of these abnormal or defective social elements presents a problem of scientific and social importance.

INSTITUTIONS OR SCHOOLS FOR THE DEAF AND BLIND.

In the year 1744 a Portuguese Jew named Pereire gave before the Academy of Science at New Rochelle, France, a most dramatic demonstration of the power of the human intellect to solve a problem of special training. He presented before the members of the academy a boy who had been born deaf, and whom he had taught to talk. From that day the world could no longer regard the training of congenitally deaf children as an impossibility, and yet, despite this brilliant solution of a problem in scientific education, the world was slow to recognize the value of Pereire's work, and it was not until the year 1867 that deaf children in the United States were taught by the oral method.

Institutions for the training of deaf children had been established many years before. This type of special school had its origin in the foundation of a school for the deaf by the Abbé de l'Épée in 1771 in

Paris. Inspired by Pereire's example, but unacquainted with Pereire's scientific knowledge and unpenetrated by his educational genius, the Abbé de l'Épée was moved more by the spirit of philanthropy to care for and educate deaf-mutes. Pereire was perhaps too far ahead of his time to impress the world with the importance of his achievement. Moreover, he never inducted others into the secrets of his method, and with the single exception of Heinicke, in Germany, those interested in the training of deaf children failed during almost a century to grasp the physiological and psychological elements of the problem.

The world has now caught up with Pereire, and public education is about to enter into the full enjoyment of the results of his labors and of the labors of many others in this and cognate fields. It behooves all who are interested in the development of all types of special education to see to it that the work which scientific men within the field of education are accomplishing shall be made available to others. The work must be thoroughly grounded upon scientific principles, and scientific workers as well as trainers of exceptional children must be provided with the professional equipment and the physical means to undertake this work satisfactorily.

The successful training of deaf children stimulated an interest in the blind. By the beginning of the nineteenth century an initial attempt to provide for the training of these two classes of defective children had been made by the civilized nations of Europe and America.

REFORM SCHOOLS.

The next group of exceptional children to be provided for were those who stood in danger of growing into an adult life of criminality; in other words, children in need of special moral training. This movement was inspired partly by the general movement for prison reform in England and partly by the work of such men as Pestalozzi, who were keen to recognize the danger to the continental countries arising from the number of destitute, vagrant, and morally neglected children who had been deprived of their natural protectors by the Napoleonic wars.

In the United States, "houses of refuge" began to be established in 1824, and three of them were soon in existence—one in Boston, one in New York, and one in Philadelphia. These institutions were started not as a part of the prison system, but as an experiment in special education. No one can comprehend the history and present status of houses of refuge and other reform schools who fails to recognize that the inspiration for their establishment was exactly the same as that which led in the last decade of the nineteenth century to the founding of parental schools and public day classes for truants and disciplinary cases. The supreme court of Pennsylvania has decided

in a well-known case that the house of refuge is not a penal institution, but a school. The children sent to the reform school become the wards of the State until they are 21, not because of the overt act, but because their actions have proved them in need of special oversight and moral training, or else their home environment or their personal characteristics prove them morally endangered.

IDIOCY AND RETARDATION.

The effort to train the group of children variously designated as feeble-minded, imbecile, or idiotic led first to the scientific appreciation of the problem of retardation and to a real understanding, mainly through the work of Seguin, of the problem of special education in relation to arrested or retarded development.

As in most discoveries, accident and misapprehension played a large part in gaining for us a scientific comprehension of "retardation." A little more than a century ago, in the year 1797, a boy apparently about 12 years of age was found running wild, like a beast of the field, through the forests of Aveyron, in the southern part of France. No one ever knew his origin, or where or how he had spent the years between his birth and his discovery. Devoid of the faculty of speech, he showed very few signs of intelligence and made his wants known through the simplest of inarticulate cries. He selected his food by the sense of smell, and what he chose proved him unaccustomed to the dietary of civilization. He drank by lying flat upon the ground and thrusting his mouth beneath the surface of the water. He often walked on all fours, and fighting with his teeth like an animal, he resisted the placing of garments upon his back, and made unremitting efforts to escape. Subjected to confinement and forced to submit to the ways of civilized life, he proved to be fairly tractable.

Brought to Paris he excited the liveliest interest and was presented as an object of scientific curiosity before the French Academy of Science. Pinel, the famous physician of the insane at Bicetre, declared the child idiotic and therefore untrainable. But Itard, a physician of that first institution for the training of deaf-mutes, established at Paris by the Abbé de l'Épée, believed the boy to be merely wild and untaught. He undertook this boy's training, admitting the close resemblance of the boy's condition to idiocy, but believing that he could be restored to the normal mental life of humanity, because of his conclusions as to the "cause and curability of that apparent idiotism." To express Itard's opinion in modern language, the boy in his opinion was not a case of idiocy, but a case of arrested or retarded development, the result of neglect and separation from the normal human environment.

The outcome of Itard's self-assumed task was to prove him doubly in the wrong. The result of his training showed first that the boy was an idiot and secondly that an idiot could be trained. Itard's failure—for he could not restore this boy to normal mental condition—is one of the great successes in the history of education and mental science. Itard himself scarcely recognized the significance of his own success. Interested in the boy as a primitive savage who had been retarded in development because of the absence of the normal human environment, Itard failed to see that this boy, idiot though he was, suffered from an arrest or retardation of development due to physiological causes resident within himself. The discovery that idiocy is retardation was left for Itard's pupil, a physician, psychologist, and educator, Edward Seguin.

On the basis of the accomplishment of Pereire and Itard, Seguin made the deduction that feeble-mindedness is an arrest of mental development necessarily consequent upon the imperfect sense organs and organs of motion with which these children are endowed at birth. He proposed to exercise the imperfect organs so as to develop their functions, as Pereire had previously developed the organs of articulation in deaf-mutes, and to train the functions of the organism so as to develop the imperfect organs. He defines his system as "the adaptation of the principles of physiology through physiological means and instruments to the development of the dynamic, perceptive, reflective, and spontaneous functions of youth."

Seguin began his first experiment in the training of a feeble-minded child in 1837. So successful was this expert physiological education of all the senses that Seguin won for himself, as Itard had before him, the commendation of the Academy of Science. In 1842 he formed the first small class of feeble-minded children, whose training he undertook at the Bicetre.

Seguin's work became a model for the countries of the civilized world. Inspired by his example and assisted by his treatise on idiocy, published in 1846, training schools for feeble-minded children were established first in Massachusetts in 1849, and in the next few years in New York, Pennsylvania, and other States of the Union.

The next contribution to an understanding of the meaning of the word retardation came directly out of school practice. First among civilized nations Germany addressed itself to the task of educating every child, long before this country had even awakened to the fact that many of its prospective citizens were not receiving sufficient school training to cast an intelligent vote. Just as soon as compulsory education laws were partially enforced and a serious effort made to educate every child, it was found that there are children not properly called feeble-minded who are yet incapable of making normal progress in the ordinary day schools. The appreciation of the

necessity of providing a special form of training for these backward pupils led to the organization of the first special class in Dresden in 1865.

In this country the compulsory education laws began to be really enforced in a few States about 1890. As a consequence truant schools, disciplinary schools, and schools for backward children came into existence in some States. The idea of establishing day classes and schools for deficient children appears, however, to have been first introduced to American teachers by August Schenck, of Detroit, in 1878, in an address to the American Teachers' Association. Dr. Andrew Rickoff, superintendent of schools for the city of Cleveland, acting on Schenck's suggestion, established two classes in Cleveland, limiting them, however, to disciplinary cases. The second class was established in Chicago in 1892. This is still in existence, and other special classes have been added. New York established its first class in 1895, under the direction of Miss Elizabeth Farrell. Several other classes have since been formed, and in 1905 adequate supervision was first provided through the appointment of Miss Farrell as inspector of ungraded classes. In the same year, or a year later, a school was organized at Waukegan, Ill., by Supt. Hall, designed for backward children of all kinds, those mentally deficient as well as those retarded through lack of educational advantages.

The first city to plan for a complete organization of these classes directly under the city superintendent was Providence, R. I., which formed six classes for truants and disciplinary cases in 1893, and a separate class for backward children in 1896. Springfield, Mass., organized a special class in 1898, under Supt. Balliet. Boston and Philadelphia followed in 1899; Cleveland established four classes in 1905, and Portland, Me., established a class in 1906.

Another movement undoubtedly played an important part in the awakening of the school authorities and general public to the existence of retardation as an educational and social problem. The introduction of medical inspection into the schools, originally for the detection and prevention of contagious and infectious diseases, led to the discovery and treatment of physical defects, which were found to be a powerful factor in retarding the school progress of many children. Medical inspectors and school nurses, and in more recent years social visitors, are appointed in many cities as an integral part of the school system. Without them it would be impossible to realize the purpose for which the schools exist. The medical profession, both in this country and abroad, has made contributions of great value bearing upon the physical causes of arrested and retarded development.

In the course of time the term "retardation" has come to cover types of children hitherto considered normal. Compared with imbeciles and idiots these children are undoubtedly normal, but com-

pared with those children who are passing upward through the grades without meeting serious obstacles to their progress, these children manifest an arrest or retardation of development. In some this is dependent upon internal physiological causes, a defect of the brain or nervous system, even though a minor defect. In others it is due to physical defects, bad eyesight or hearing, which only indirectly albeit seriously affect the normal development of the brain. We have come to recognize retardation as a mental status, not a brain disease or defect as is idiocy. Retardation is a stage of mental development which can only be defined with reference to what we assume to be the regular course of normal development. Any child, the functions of whose brain are not developed up to the normal limit for his age, is suffering from retardation. A status or stage of progress which may be retardation for one child may not be retardation for another. The physiological and psychological age of a child need not correspond to his chronological age. We have come to see that children who stand at the head of a class in school may be more retarded than children who are at the bottom of a class. There are those who contend that the schools give relatively less training to those who are mentally well endowed than they do to the average pupil or to the dullard.

When retardation is thus defined in terms of individual development the necessity clearly arises for the public schools to provide for the highly gifted children as well as for those less fortunate in natural endowment. The question of importance is as to the number of these exceptional children in the schools. Up to the present time school statistics have limited themselves to enumerating the retarded children, using that term to indicate those children who are behind grade for their age. Pedagogical or school retardation follows from the supposition that a child enters upon his first year of school work before he has passed his seventh birthday. If he advances one grade each year he will complete the eight years of the elementary course before he has passed his fifteenth birthday. This establishes a theoretical age limit for each grade, apparently not excessive in its educational requirements; for the child who leaves the elementary schools in his fifteenth year can not complete the high school before his nineteenth year or graduate from college before his twenty-third year. Supt. Bryan, of Camden, N. J., first collated statistics of retardation based upon the enrollment figures of that city for two successive years, 1904-1906. He found in the elementary schools of Camden that 72 per cent of the children exceeded the theoretical age limit; that 47 per cent exceeded the age limit by one year or more; 26 per cent by two years or more; 13 per cent by three years or more; and 5 per cent by four years or more.

It is generally agreed to call a child retarded or backward who exceeds the age limit by two years or more. The discovery of the existence of over-age and retarded children, and the development of the methods of determining their number, is the work of Maxwell, Bryan, Cornman, Falkner, and Ayres. The literature of retardation has rapidly acquired extensive proportions. The working out of the many practical problems which arise in connection with the treatment of backward children will have consequences which will affect every type of child in the public schools.

SPECIAL CLASSES FOR PHYSICAL DEFECTIVES.

In this country and also on the continent of Europe, sporadic efforts have been made in the public schools to care for various classes of physical defectives. In the United States, especially successful efforts have been made to train in public day classes deaf children and blind children. The best day classes for such children have been located in the Middle West, probably because in that locality adequate provision had not been made by the State in the establishment of institutions for their care and training. It would seem as though in the United States the two systems of handling deaf and blind children will be on trial for some years, to determine whether the custodial school or the day school is the more efficient and economical, and also which is the better adapted for the all-round development of the child.

In England and the United States special classes have been organized for crippled children, in many places the children being transported to the schools from their homes. In Baltimore, special classes have been established for epileptic children. The development of preventive medicine, together with the progress of medical school inspection, has led in many localities to the organization of open-air schools and of special schools for children suffering from tuberculosis.

THE GIFTED CHILD.

The problem of the gifted child may be said to have first provoked action when Dr. William T. Harris, as superintendent of the schools of St. Louis, introduced, as long ago as 1872, a plan for making promotion fit different intellectual grades. In many localities the development of a fixed and rather static grading system and promotion system, particularly when promotions were made only at yearly intervals, led to the discovery that many children are kept back unduly, owing to the "lock-step" system. Many efforts have been made toward the solution of this problem—ungraded classes, more rapid promotion through special tutoring and systems of flexible grading, the method of dividing grades up into groups according to

intellectual ability, etc. Several cities have made provision for the more rapid progress of gifted pupils by gathering them into centers where, under especially skilled teachers, they pursue a curriculum modified by the early introduction of some of the high-school studies. It is probable that very many men have been induced to see more clearly the necessity of providing for the gifted child, since so much attention has been given to the backward and defective child.

CHAPTER II.

PROPORTIONS OF SCHOOL POPULATIONS COMPOSED OF EXCEPTIONAL CHILDREN.

If all of the children in our public schools could be ranked according to their intellectual abilities, it is probable that a rough classification would group them about as follows:

Talented.....	4 per cent.
Bright.....	} 92 per cent.
Normal.....	
Slow.....	
Feeble-minded.....	4 per cent.

The 4 per cent here designated as feeble-minded may for administrative purposes be divided into two groups. The lower one includes about one-half of 1 per cent of the entire school membership and consists of children of the lowest grade of mentality found in the public schools. They are genuinely mentally deficient, and can not properly be treated in the public schools. They are institution cases, and should be removed to institutions.

Ranking just above these are the remaining $3\frac{1}{2}$ per cent who are feeble-minded but who can be given a certain amount of training in special classes in the public schools. This is not the sort of treatment that they should ideally receive, for few of them can ever become independent members of the community, but it is the sort that they should have if they are to be dealt with at all by the public-school systems as now constituted.

The foregoing statements in regard to this lowest group in the intellectual scale are of necessity based on meager evidence, for the reason that few comprehensive psychological surveys of entire school systems have been conducted. They represent the conclusions arrived at by those who have conducted such investigations as have been made. The best evidence bearing on the problem is to be found in the following reports:

Two Thousand Normal Children Tested by the Binet Scale. The Training School, January, 1911.

The Classification of Clinic Cases. Holmes. Psychological Clinic, April, 1911.

What Can the Public School Do for Subnormal Children? The Training School, September, 1910.

Report of Committee on Special Education. Report of United States Commissioner of Education, 1910, Vol. II, pp. xxi-xxv.

SLOW, BACKWARD, RETARDED, OR LAGGARD CHILDREN.

Ranking above the feeble-minded group comes a much larger class of children, constituting anywhere from 10 to 50 per cent of the entire school membership, made up of those who are not mentally deficient, but who make slow progress through the grades. In point of numbers and importance these children constitute a great, if not our greatest, school problem. They make up about one-third of the total school membership in the average city, and in most localities their numbers are distinctly greater among the boys than among the girls.

These backward children who take more than the normal time to complete the work of each grade are the children who usually spend their entire school lives in the lower grades, and fall out of school permanently without completing even the elementary course. It is this pedagogical retardation among great numbers of children who have no congenital mental defect that is responsible for the school evils known as repetition, retardation, and elimination.

Data concerning the number of these children in different city school systems may be found in a large proportion of all of the numbers of educational periodicals issued during the past four years, and in most of the recent reports of city school superintendents. Summaries of conditions are presented by Ayres in "Laggards in our schools," Chapters IV and VII, and in the Report of the Commissioner of Education, 1910, Vol. II, pp. xxi to xxv.

NORMAL AND BRIGHT CHILDREN.

The largest group is that composed of the normal and bright children who have no great difficulty in completing the work of the grades satisfactorily in about the allotted time. The size of this group in school systems as commonly organized varies from about 40 per cent to about 80 per cent of the entire membership. This wide range of variability does not indicate that the children of different cities are of such varying degrees of mental ability as the figures would seem to show. It merely reflects the fact that in some cities the demands of the school curriculum and the teaching methods are much more nearly in accord with the abilities of the children than they are in others.

TALENTED OR EXCEPTIONALLY BRIGHT CHILDREN.

Quantitative evidence as to the number of exceptionally bright children found in our public schools is even more rare than is such evidence with respect to the feeble-minded.

Such data as are available seem to indicate that about 4 per cent of the entire school membership may fairly be rated as exceptionally bright or talented. Reference has already been made to the report of the testing of 2,000 normal children by the Binet scale, conducted

by the New Jersey Training School. This test showed that somewhat more than 4 per cent of the school children were mentally more than one year ahead of their ages. These are the children who are born with exceptional endowments, and go through the public schools with greater than average ability and rapidity.

Another bit of evidence is found in Volume II of the 1910 Report of the Commissioner of Education, in a table printed on page xxiii. This table presents figures from 319 cities, showing that in the average city about 4 per cent of the pupils are one year or more under age for their grades.

Still further evidence is presented by Ayres, in Chapter VII of "Laggards in our schools," where figures are given from different cities showing that the number of children making more than normally rapid progress through the grades ranges from 1 to 5 per cent of the entire membership.

That these unusually able children have been given scant attention in our public schools is shown by the fact that at the present time only five cities are known to have special classes for exceptionally gifted children. These cities are Baltimore, Worcester, Indianapolis, Lincoln, and Rochester.¹

SUMMARY.

1. In a normal school population about one-half of 1 per cent of the children are genuinely mentally deficient and should be treated in institutions.

2. Ranking above these comes a group of feeble-minded children, constituting about $3\frac{1}{2}$ per cent of the school membership. These children are educable in special classes of public schools, but few of them can become independent members of the community.

3. Ranking above these children comes a larger group of mentally sound, but slow, children. This group constitutes from 10 to 50 per cent of the membership, and in the average city amounts to about 33 per cent. These are normal individuals for whom the present school curriculum and régime are ill adapted. In most cities a majority of them are boys.

4. Ranking above these pupils is the large mass of school children who make substantially normal progress through the grades and some of whom make rapid progress. These constitute from 40 to 80 per cent of the school membership.

5. At the upper end of the scale comes a group of unusually bright or talented children, composing about 4 per cent of the total number. Only five cities have so far organized classes for these supernormal children.

¹ In answering the questionnaire, a copy of which appears on p. 31, 54 superintendents write "yes" after item No. 14; but it seems quite certain that the great majority of those answering thus regard some form of flexible grading as the special provision meant.

CHAPTER III.

THE CLASSIFICATION OF EXCEPTIONAL CHILDREN.

We assume that this bulletin is addressed to those who are interested primarily in questions relating to the proper treatment of exceptional children rather than in a scientific classification based upon a recognition of the causes of exceptional character in children. The most significant distinction is that between children who can not properly be educated in the public schools and children who can be adequately instructed and trained in day classes. We shall therefore make our primary classification the distinction between institution cases and public-school cases.

It is difficult to state any one basis for the establishment of this classification. There are at least three grounds for this distinction. In the first place, there are children idiotic and imbecile, children morally degenerate and delinquent, children severely crippled or suffering from a disease like epilepsy, whom any superintendent would recognize as being unfit for association with normal children in the grade. Many of these children are the subjects of custodial treatment only, even inside the institution in which they may be segregated.

A second basis for this distinction has reference to the curability or relative permanence of the child's condition. Certain children who are approximately normal in appearance and in mental character are yet hopelessly degenerate. For their own safety and for the safety of the children with whom they may be associated in the public schools, it is desirable that they should be removed from the schools and placed in institutions. Some of them are educable and can perhaps be trained in the public day schools, but it would be undesirable for them to be thus treated. The most dangerous types of moral imbeciles come in this class. These children some competent authority connected with the public-school system should be quick to recognize. Experts should be called in and the school authorities ought to lend their every assistance to obtain legal sanction for the segregation of these children in special institutions, in order that they may not pass their lives among normal children, with the danger of moral contagion and the possibility of propagating their kind.

The third basis for the distinction between an institutional and a public-school case is amenability to treatment in the public schools and institutions. It stands to reason that an institution which con-

trols every hour of a child's existence—sleeping or awake—ought to be able to provide more effective training for difficult cases than can the public schools in day classes. In distinguishing between those cases which should be sent to institutions and those which should not we must take into consideration whether the child requires the kind of work which the public school can not supply in day classes.

A most confusing circumstance arises from the fact that the various types of exceptional children shade off into normal types of children. From children who are slightly slow and dull by nature, there is a steady gradation through children that are only touched with feeble-mindedness to children who are classified in institutions as "high-grade imbeciles," "middle-grade imbeciles," "low-grade imbeciles," "superficial, and profound idiots." Ordinary teachers, superintendents, and casual observers will have no difficulty whatever in excluding idiots and low-grade imbeciles from the public schools. Indeed, it is very rare that children below the grade of middle-grade imbeciles are found in the public schools. The border-land cases, high-grade imbeciles, perhaps even middle-grade imbeciles, will be interpreted very diversely by those who are not familiar with these classes of children. Some teachers and superintendents will think that they have in middle-grade imbeciles very good material to work with in the public schools; whereas expert opinion may advise the removal of such children from public day classes to institutions.

Another circumstance is that many children are what some call *apparently* feeble-minded or imbecile; that is to say, they present all of the features of permanent imbecility excepting that they very rapidly recover or are restored to approximately normal condition under proper physical and mental treatment. Some distinguish these types of children as suffering on the one hand from imbecility and on the other from pseudo-imbecility. We distinguish between them as being permanently feeble-minded or imbecile, and curably retarded in development. Two children may present exactly similar characters and yet one child may, as the result of a year's special training, be restored to the grades and be capable of continuing in the grades and making normal progress; whereas the other child may, after a year's trial, be finally sent to the institution to which he should have been sent without the waste of a year's time.

The expert is more capable of classifying children into these two groups of institutional and public-school cases than is the uninstructed teacher or layman; but there are doubtful cases where even expert opinion is unable to decide. There will, therefore, always be reason for keeping some of these children in special classes, under observation pending a final diagnosis.

We shall now briefly and concisely distinguish between those cases which we regard as institutional and the cases of those whom we

regard as susceptible of treatment in special classes. It will be necessary for us to recognize a third group, comprising types of children concerning whose treatment, whether in institutions or in public day classes, there may be diversity of opinion and practice. It must be premised that our treatment is largely experimental and will probably remain so for many years to come. What place institutions for the training of blind, deaf, and other types of exceptional children shall play in the future and especially in those communities which are approaching this problem for the first time, it is impossible for us to say. Modern criticism of institutional life has led to many reforms in institutional procedure. Much objection that can at present be laid against many institutions for children will undoubtedly be set aside in the future as institutions encourage and develop separation into small groups; for example, separate homes or cottages. There can be no doubt that an institution which need not consider per capita cost can provide children with homes and schools of a character which will conserve the whole life of the child. On the other hand, there is a strong tendency toward the unification of all educational institutions and there is little doubt but that the public schools will be held responsible by many communities for the educational treatment of types of children who in the past have been committed to special institutions. For some cases, e. g., persistent truants, disciplinary cases, children suffering from ill health, children who are a heavy economic tax upon their families, and children whose home life negatives completely the influence of the school, the public schools of the future may be required by an awakened community to provide parental schools, where children will be boarded as well as educated, and where the advantages of home training and discipline will be combined with the special class of instruction.

The grouping which we make, therefore, is to be regarded as a tentative or temporary effort, one which we shall feel under no obligation to defend but which we embody in this bulletin for the purpose of assisting in clarifying the thought of those who are professionally interested in the treatment of exceptional children.

I. INSTITUTIONAL CASES.

(To be dismissed from the oversight and care of the public school authorities.)

1. Morally insane children.
2. Violently insane children.
3. Demented children.
4. All feeble-minded children below the grade of middle-grade imbecile. (Barr's classification.)
5. High-grade moral imbeciles.
6. Severe cases of epilepsy.
7. Cases of contagious and infectious diseases. (Some to be dismissed temporarily; some for prolonged periods.)
8. Children helplessly crippled or suffering from revolting physical deformity.

II. CHILDREN FOR SPECIAL CLASSES OR SPECIAL INSTRUCTION IN THE PUBLIC SCHOOLS.

1. Foreign.
2. Late entering.
3. Backward but capable of rapid restoration to normal grade.
4. Dull and feebly gifted.
5. Children requiring vocational training.
6. Children of precocious physical development, especially of precocious sex development.
7. Exceptionally gifted or able children.
8. Children suffering from various physical defects of minor character but interfering with their progress and unfitting them temporarily or permanently for the grades.
9. Speech cases.
10. Social cases; those whose retardation is chiefly due to home conditions calling for the services of a social visitor as well as a special teacher.

III. CHILDREN OF UNCERTAIN CLASSIFICATION. INSTITUTIONAL OR SPECIAL CASES.

1. Blind and semi-blind.
2. Deaf and semi-deaf.
3. Delinquents, including persistent truants.
4. High-grade imbeciles. (Barr's classification.)
5. All feeble-minded children of higher grade than high-grade imbeciles.
6. Crippled children.
7. Children suffering from epilepsy in mild degree or from nervous or other diseases rendering them difficult or improper members of ordinary classes.

CHAPTER IV.

METHODS FOR DETERMINING THE EXTENT AND DEGREE OF RETARDATION IN CITY SCHOOL SYSTEMS.

The term "retarded" is used with increasing uniformity to describe the condition of children who are too old for their grades. It describes but it does not attempt to explain. There are only two reasons why children may be too old for their grades—they may have entered school late or they may have progressed slowly. In either case the term "retarded" is used by educational economists to describe their condition.

THE AGE AND GRADE TABLE.

The quickest and easiest way in which a school superintendent can discover how many retarded children there are in his school system is by means of a table showing how many children there are of each age in each grade in his schools. The table on the following page shows the distribution of children by grades and ages in the schools of Elmira, N. Y., in October, 1910.

It will be noted that there is a heavy broken line running through the table. In the first grade this line divides the figures so as to leave on the left those referring to the children less than 8 years of age and on the right those 8 years old and older. That is, the figures on the left refer to children of normal age and those on the right to over-age children. The line is broken to make a similar division between the figures for the 8 and the 9 year old children in the second grade, between the 9 and the 10 year old ones in the third grade, and so on for all the grades. The criterion used defines a child as of normal age in each grade as follows:

Grade.	Normal age.	Grade.	Normal age.
1.....	Under 8 years.	5.....	Under 12 years.
2.....	Under 9 years.	6.....	Under 13 years.
3.....	Under 10 years.	7.....	Under 14 years.
4.....	Under 11 years.	8.....	Under 15 years.

This standard for dividing children into normal and over-age groups in each grade has received general acceptance in the past few years and is now in common use in city, State, and National reports.

Referring again to the table, it will be noted that there are three columns at the right-hand end, the first of which gives the total number of children in each grade, the second the number of over-age

children, and the third the per cent that these children are of the whole number. At the bottom is a row of totals giving the number of children at each age, the total number of children, and the number and per cent of over-age ones.

Age and grade tables have suddenly come into common use, because superintendents are discovering that they are the most valuable single form of statistical statement used by schoolmen. They are basal to studies of retardation. By their use a superintendent can easily find out how many over-age children there are in his school system, where they are, and who they are.

For purposes of comparison of conditions in successive years or between different cities it is essential that the date of gathering the data and the basis of enumeration be uniform for all the cities. The most satisfactory basis of enumeration is the enrollment on a given date and the best date is probably that adopted by the United States Bureau of Education and the United States Immigration Commission, which is the second Monday in December.

THE METHOD OF LOCATING THE 13-YEAR-OLD CHILDREN.

A still simpler method for comparing conditions in different cities, or in different parts of the same school system, or for the same city in different years is that proposed by Dr. Roland P. Falkner in the Psychological Clinic for January, 1911. This is based on discovering the whereabouts of all of the 13-year-old children in the school system.

For example, reference to the Elmira table for 1910 shows that there were 13-year-old children in all of the grades from the second to the eighth, inclusive. These children have almost reached the limit of the compulsory school period and it is certain that those not within a year or two of graduation will nearly all drop out without completing the course.

In the case in point the 13-year-old children in the sixth and lower grades number 191 out of a total of 367, or 52 per cent. This fact is one significant measure of the efficiency of this school system. It means that 52 per cent of these children are educational misfits. They are wrongly placed in the grades, they hinder the other children, and they make the work of the teacher harder and less effective. Most of them will leave school without completing the course. The method of locating the 13-year-old children is significant because it furnishes a measure of what the school system accomplishes for the children within the period of compulsory education. It is most simple and easily applied. The necessary data can be gathered in most schools in a few hours and to secure them involves no delay and requires no installation of new forms of record keeping.

REPEATERS.

A third simple method for discovering which children are not making satisfactory progress consists in having each teacher report the number of children who are doing the work of their present grades for the second, third, or fourth time. These children are termed repeaters. The principal advantage of the method is that in gathering the data for the report the teachers become interested in the individual cases of the children to an extent which is usually not equaled when they simply report the ages. The great weakness of this method is that it only takes into account the status of the children in their present grades and does not concern itself with the number of times they repeated the work of lower grades. Because of this defect it gives deceptively favorable mass results.

TIME IN SCHOOL, OR THE PROGRESS STANDARD.

The methods so far discussed for determining the extent and degree of retardation in city school systems are all based on different combinations of data, giving the grades and ages of the children, or the time that they have been in their present grades. The method which gives the best and fullest information is one that combines all three of these criteria and tells where the children are in the school course, how old they are, and how long it has taken them to reach their present grades. This method can be used only where the school records include individual cards, giving the school history of each pupil, or where such individual history can be gathered by means of a special investigation.

The following table presents the results of tabulating the individual records of 980 pupils in the fifth grade in 19 New York City schools at the close of the school year 1907-8:

Age and time in school, fifth grade, 19 schools in New York City, 1908.

Years in school.	Ages.										Total.
	9	10	11	12	13	14	15	16	17	18	
2.....		1		1	1						3
3.....	1	8	7	9	1		1				27
4.....	33	62	22	13	5		1				136
5.....	9	100	192	81	36	16					434
6.....		12	68	111	42	9	6				248
7.....			9	27	37	19	3				95
8.....				3	12	13	2				30
9.....						4	1			1	6
10.....						1					1
Total.	43	183	298	245	134	62	14			1	980

By referring to the top row of figures, it will be seen that these children varied in age from 9 to 18 years, and reference to the first column shows that they had been in school from 2 to 10 years. There is a heavy vertical line, on the left of which are the figures representing children 11 years old or less, and on the right, those representing children 12 years old or older. As 11 years is the limit of normal age for children in the fifth grade, this leaves on the left-hand side of the line the figures representing all of the normal-age children, and on the right those representing children who are over age. Children who have been in school 5 years or less and are in the fifth grade have made normal or rapid progress. Those who have been in school more than 5 years have made slow progress.

These two groups are divided by the heavy horizontal line. This gives us a table representing the status of all of the fifth-grade children with respect to their ages and their school progress. All of those represented by figures on the right-hand side of the line are above normal age, and all of those represented by figures below the horizontal line have made slow progress. This arrangement enables us to classify our children in four groups, as follows:

Upper left-hand section: 435 children who are of normal age and have made normal progress.

Lower left-hand section: 89 children who are of normal age and have made slow progress.

Upper right-hand section: 165 children who are above normal age and have made normal progress.

Lower right-hand section: 291 children who are over age and have made slow progress.

These data enable the school superintendents to classify the children of the grade in the four groups, according to their educational needs, and to find out which of them are over age because they entered school late, and which ones are over age because they have made slow progress. The children represented by the figures in the upper left-hand section constitute 44 per cent of the entire grade membership. They are of normal age, and they have been making normal progress. They are not subjects for specialized attention.

The 89 children represented by the figures in the lower left-hand section constitute 9 per cent of the grade membership. They are of normal age, and have made slow progress; and the only reason that they are not numbered among the over-age children is that they were very young when they entered school. Their cases are not yet serious, but they should be carefully watched.

The 165 children represented by the figures in the upper right-hand section are above the normal age, and have made normal progress. That is to say, they entered school late, and the school is not to blame

for their being over age at present. Nevertheless, as they are relatively mature, they should be given special opportunities to make rapid progress. They constitute about 17 per cent of total membership.

The 291 children represented by the figures in the lower right-hand section constitute 30 per cent of the grade membership, and are both over age and have made slow progress. These are the serious cases, and they should be given the most careful consideration. They are genuinely backward, and are not only too old for their grades but are chronic repeaters.

The foregoing analysis shows with sufficient clearness the advantages of this form of table. It gives all of the information furnished by the other methods, and much in addition. The disadvantages connected with its use are, first, that the data can not be gathered until the individual school history of each child is secured, and, second, a separate table has to be made for each grade. It is impossible to construct one showing conditions in the entire school system. Moreover, where semiannual promotions are in force, such a table should be extended so as to show both ages and time in school by half years.

A METHOD FOR DISCOVERING THE CAUSES OF RETARDATION.

Children who make slow progress do so because they fail of promotion. Hence the most direct way to discover the causes of retardation is to find out the salient differences between the promoted and the nonpromoted children.

The easiest way to do this is to record significant facts regarding all of the pupils at the close of the school term or year, and tabulate them for the promoted and the nonpromoted pupils, so as to discover in what respects conditions in the first group differ from those in the second group. This avoids the common error which results from gathering data concerning solely the pupils who fail, and then having no way to determine how these pupils differ from the successful ones. A blank form, which has been successfully used for gathering significant data for promoted and nonpromoted pupils, is the following:

Records of promoted and nonpromoted pupils.

	Number among children promoted at end of year.	Number among children not pro- moted.
Boys.....	_____	_____
Girls.....	_____	_____
Average age.....	_____	_____
Average days attended.....	_____	_____
From non-English-speaking families.....	_____	_____
Foreign born.....	_____	_____
Suffering from malnutrition.....	_____	_____
Mentally defective.....	_____	_____
Defective vision.....	_____	_____
Defective hearing.....	_____	_____
Adenoids.....	_____	_____
Other throat troubles.....	_____	_____
Enlarged glands.....	_____	_____
Defective teeth.....	_____	_____
Other defects.....	_____	_____
Grade——. School——. Teacher——. Date——.		

In a recent investigation the use of this blank showed that non-promotions were much more frequent among boys than among girls, and that attendance was much poorer among the nonpromoted than among the promoted children. The average age of the nonpromoted children was greater than that of the promoted ones, more of them came from non-English-speaking families, and more of them were foreign born. The nonpromoted children showed much higher percentages of physical defectiveness.

The use of this blank enables the superintendent or principal to rate the different retarding influences in the order of their importance, and as a consequence to take measures looking toward their elimination.

SUMMARY.

The age and grade table tells how many and what proportion of the pupils are too old for the grades they are in. It furnishes the quickest and easiest means for discovering conditions throughout a school system.

The method of locating the 13-year-old children shows what the school has accomplished for the children up to the limit of its legal control over them. It furnishes an indicator of the results of retardation, but does not give a survey of the whole system. It is the most easily applied of all the measures of retardation.

The enumeration of the repeaters in each grade shows which children need special attention at any time. It is easily done, but it does not show which children are chronically backward and which are temporarily or accidentally so.

The age and time-in-school table furnishes the most complete and useful information about the children. It shows which children are over age because they have made slow progress and which ones are over age because they entered school late. It furnishes the best method for discovering the significant facts about the school progress of the children, but it can only be used where individual school histories can be obtained.

The causes of retardation can best be discovered through investigating the differences between the promoted and the nonpromoted pupils.

CHAPTER V.

PROVISION FOR EXCEPTIONAL CHILDREN IN CITY SCHOOL SYSTEMS.

Under date of March 15, 1911, an inquiry was addressed to the superintendents of city schools throughout the United States, asking them for information as to what was being done in their systems to provide for the needs of exceptional children. The inquiry form used was as follows:

WASHINGTON, D. C., *March 29, 1911.*

DEAR SIR: Will you kindly answer the following questions and return this sheet to me at once for the use of a committee which is preparing for the Bureau of Education a bulletin on *Provision for Exceptional Children in the Public Schools?*

Have special classes been formed in your city under the following or other names (answer yes or no)?

1. Delinquent.....
2. Backward.....
3. Defective.....
4. Blind or semibland.....
5. Deaf or semideaf.....
6. Open air.....
7. For foreigners—day schools.....
8. For foreigners—evening schools.....
9. Vocational.....
10. "Continuation".....
11. Parental or residential.....
12. Epileptic.....
13. For late-entering children.....
14. For gifted children.....

Under other names:

15.
16.
17.
18.

Have you any provision for:

1. Medical inspection for contagious and infectious diseases.....
2. Physical examination for defects.....
3. Dental clinics.....

Any reports or documents you may have and any rules, regulations, or by-laws adopted by your board of education with reference to such special features of your school work will be greatly appreciated.

Yours, respectfully,

_____,
Commissioner.

Name, _____.

City, _____.

The number of these questionnaires sent out was 1,285, and the list to which they were sent includes all of the municipal school systems regularly organized under superintendents. Eight hundred and ninety-eight replies were received, divided among the five State divisions as follows:

North Atlantic.....	370
South Atlantic.....	60
South Central.....	90
North Central.....	322
Western.....	56
Total.....	898

For the purpose of interpreting the results, the answers have been divided into four groups, and the information treated as referring to provision made for children who are exceptional (1) morally, (2) mentally, (3) physically, and (4) environmentally. The different kinds of special provision offered in city school systems have been roughly grouped under these four headings as follows:

I. Morally exceptional:

- (a) Classes for delinquent, incorrigible, and refractory pupils.
- (b) Parental and residential schools.

II. Mentally exceptional:

- (a) Classes for backward children, including help through special teachers, etc.
- (b) Classes for mentally defective children, epileptics, etc.
- (c) Classes for exceptionally gifted children.

III. Physically exceptional:

- (a) Classes for blind or semiblind.
- (b) Classes for deaf or semideaf.
- (c) Classes for dumb.
- (d) Classes for stammerers, stutterers, and lisps.
- (e) Open-air classes for children physically subnormal.
- (f) Classes for crippled children.

IV. Environmentally exceptional:

- (a) Classes for non-English-speaking children, in either day or evening schools.
- (b) Classes for children who enter late.
- (c) Classes for children from subnormal homes.

PROVISION FOR THE MORALLY EXCEPTIONAL.

According to the returns, 152 cities are making special provision for morally exceptional children. The following table shows the distribution of these cities by State divisions, and by the kind of provision made. The identity of these cities, as well as that of those from which the data of all the following text tables have been secured, may be learned by consulting the tabular presentation of the appendix, which gives by States and individual cities the information secured through the questionnaire.

Cities making provision for morally exceptional children.

Division.	Cities having classes for the delinquent, incorrigible, and refractory.	Cities having parental and residential schools.	Total.
North Atlantic.....	59	10	69
South Atlantic.....	7	1	8
South Central.....	10	1	11
North Central.....	39	5	44
Western.....	13	7	20
Total.....	128	24	152

Comparison of these figures with those giving the total number of cities in each division furnishing the data shows that 17 per cent of the school systems make provision for morally exceptional children. There is noteworthy variation in the percentages for the different divisions, as the following figures show:

Percentage of cities making provision for morally exceptional children.

North Atlantic.....	19
South Atlantic.....	13
South Central.....	12
North Central.....	14
Western.....	36
United States.....	17

PROVISION FOR THE MENTALLY EXCEPTIONAL.

The school systems making provision for the mentally exceptional number 373, or 42 per cent of the total number. The following table shows how these cities are distributed by divisions, and the different sorts of provision made:

Cities making provision for the mentally exceptional.

Division.	Having classes for mentally defective.	Having classes for backward children.	Having classes for exceptionally gifted.	Total.
North Atlantic.....	44	97	22	163
South Atlantic.....	3	15	2	20
South Central.....	7	18	3	28
North Central.....	32	70	19	121
Western.....	13	20	8	41
Total.....	99	220	54	373

In this table the figures giving the number of cities having classes for the mentally defective include the cases in which the superintendents reported classes for epileptics. In a similar way the figures for classes for backward children include the cases in which the reports state that special teachers are employed to assist the slow pupils.

The question as to provision for gifted children has been given a particularly liberal interpretation by the superintendents of the 54 cities reporting such classes. In most cases this means merely that in these cities plans of flexible grading are in force which permit the unusually able pupil to make more than normally rapid progress through the grades.

The percentage figures showing the proportion of cities in each division making provision for the mentally exceptional children show, as in the former case, remarkable variability, and again the States of the Western division make the best record.

Percentage of cities making provision for the mentally exceptional.

Division.	Having classes for mentally defective.	Having classes for backward children.	Having classes for exception- ally gifted.	Total.
North Atlantic.....	12	26	6	44
South Atlantic.....	5	25	3	33
South Central.....	8	20	3	31
North Central.....	10	22	6	38
Western.....	23	36	14	73
United States.....	11	25	6	42

PROVISION FOR THE PHYSICALLY EXCEPTIONAL.

The cities making provision for the physically exceptional number 91, and the kinds of special classes maintained fall into six groups. In the following table the caption "Blind" includes classes for semi-blind, "Deaf" includes classes for semideaf, and "Stammerers" includes classes for stutterers and lispsers.

Cities making provision for the physically exceptional.

Division.	Classes for blind.	Classes for deaf.	Classes for dumb.	Classes for stam- merers.	Open-air classes.	Classes for crip- pled.	Total.
North Atlantic.....	4	6		1	12	1	24
South Atlantic.....					1		1
South Central.....					1		1
North Central.....	9	34		1	9	2	55
Western.....	1	6	1		2		10
Total.....	14	46	1	2	25	3	91

One noteworthy feature of this showing is the large number of cities in the North Central division having classes for the deaf and the comparatively small numbers in the other divisions. Another is the small number of cities in the Southern divisions having special provision for the physically exceptional.

The percentage figures show that in this type of provision, as in the preceding ones, the Western division makes the best showing. Six per cent of the cities in the North Atlantic group have provision for the physically exceptional. In the two southern groups the numbers are too low to make it possible to compute the percentages. The

figures for the North Central and Western divisions are 17 and 18 per cent, respectively.

These figures giving the facts as to the different numbers of cities making provision for the needs of the physically exceptional do not include the regular work of medical inspection. Figures concerning this were gathered, however, and with the following results:

Cities having systems of medical inspection.

Division.	Having medical inspection.	Having examination for physical defects.	Having dental clinics.
North Atlantic.....	239	231	54
South Atlantic.....	28	22	9
South Central.....	48	31	6
North Central.....	174	130	44
Western.....	37	30	12
Total.....	526	444	125

PROVISION FOR THE ENVIRONMENTALLY EXCEPTIONAL.

The number of cities making provision for the pupils who are environmentally exceptional is 346, but this figure is somewhat misleading for the reason that it includes the data for cities having instruction for non-English-speaking pupils in evening schools as well as in day schools. The facts by divisions are as follows:

Cities making provision for the environmentally exceptional.

Division.	Non-English speaking (day).	Non-English speaking (evening).	Late entering.	Exceptional.	Total.
North Atlantic.....	41	122	26	.....	189
South Atlantic.....	1	4	6	1	12
South Central.....	4	8	7	.....	19
North Central.....	16	53	27	.....	96
Western.....	11	10	9	.....	30
Total.....	73	197	75	1	346

Despite the fact that the cities of the Eastern States having large foreign populations have in many cases provision for the teaching of non-English-speaking pupils, the Western division makes the best showing in this as in all other comparisons. The comparative percentage figures are as follows:

Percentage of cities making provision for the environmentally exceptional.

North Atlantic.....	51
South Atlantic.....	20
South Central.....	21
North Central.....	29
Western.....	54

United States.....	39
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CHAPTER VI.

GRADING AND PROMOTION

WITH SPECIAL REFERENCE TO THE NEEDS OF EXCEPTIONAL CHILDREN.

The administration of graded schools has long been based on the plan that at stated intervals, usually of one year, a reclassification of pupils takes place, the more proficient ones being promoted into the next higher grade, and those who have failed to cover the required ground staying where they are. In extreme cases, very backward pupils are "demoted" into the grade below.

The most obvious defect of this plan, which is still in force in many localities, is that the child who fails in one or more subjects, but who has been successful in the rest, is compelled to do again the work of the grade, and to repeat work which he has already successfully completed, as well as that in which he has failed.

The first step toward mitigating the bad effects of this process lies in the system of half-yearly promotions by which the pupil who fails has only to repeat half a year's work, instead of that of an entire year. There is little doubt as to the desirability of this plan. It is in successful operation in scores of cities, and is rapidly spreading.

Many other plans have been designed to introduce flexibility of grading. Most of these are modifications of a plan developed more than 30 years ago by Dr. W. T. Harris, at that time superintendent of schools of St. Louis. The object of this plan was to make such a modification in the promotion system as to retain the machinery of organizations by grades and regular promotions, and at the same time provide for the needs of the exceptionally bright and the exceptionally slow child.

The most thorough and extensive study of the various grading and promotion plans that has appeared in print is that presented by the Brooklyn Teachers' Association in their report printed in the fall of 1910. This investigation is based on the returns from a questionnaire that was filled in by more than a thousand school superintendents, principals, normal school pupils, and so on.

The investigation was conducted by a committee on school organization under the joint chairmanship of Messrs. Van Evrie Kilpatrick and Charles S. Hartwell. As this report constitutes by far the most general and authoritative statement of the opinions and experience of American educators concerning different grading and promotion plans, it is used as the basis for the present summary.

Well-recognized plans for securing flexibility in grading are at least a score in number. Most of them are known by the names of the places in which they have been used. For example, the Cambridge plan is one that has been used for some 20 years in Cambridge, Mass., and the Batavia plan has long been followed in Batavia, N. Y. In many other instances, while plans are known by the names of towns or cities, they have in point of fact never been in universal use in those localities.

Nearly all of these numerous plans fall into one or the other of two groups. In the first group are devices for securing, so far as possible, uniform progress through the grades on the part of all pupils. These plans depend on giving special instruction to the dull pupils in order that they may be enabled to keep up, or in giving extra work to the bright pupils in order that they may cover more than the normal amount of work outlined for each grade. These two modifications

One-half year progress.

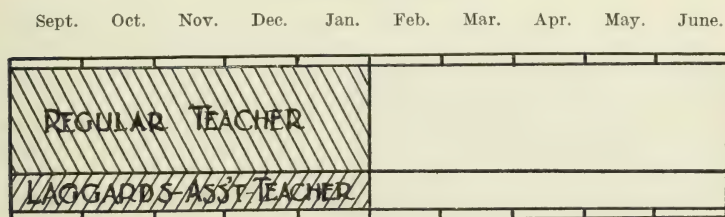


FIG. 1.—BATAVIA PLAN.—The diagram illustrates the equal progress of all the children in a given grade during one term. The coaching of the slow pupils by the assistant teacher makes this equality of progress possible.

of the plan for securing uniform progress are typically represented by the Batavia and the North Denver plans.

In the second group are grading and promotion plans which are based on the idea of permitting children of differing abilities to complete the work of the grades in differing lengths of time. The Cambridge and Chicago, or "large city" plans are typical of those which provide for differing rates of progress among different classes, while the Pueblo plan is based on the idea of letting each individual child go forward according to his particular abilities and without reference to those of the other children.

THE BATAVIA PLAN.

The Batavia plan has for many years been used in the public schools of Batavia, N. Y. In its inception it was a device resorted to in order to make tolerable the use of very large schoolrooms provided through the faulty design of one of the school buildings.

The chief characteristics of the plan are large classes with additional teachers to give individual instruction to the backward pupils

in each room. The progress of all the pupils is uniform, this uniformity being secured through the individual teaching of the slow pupils.

The principal objection to the plan is the one inherent in all attempts to teach classes of very large size. As a temporary relief for conditions brought about by overcrowded schoolrooms, the plan is probably good, but it is not to be commended for permanent use under normal conditions. Among the reports received by the Brooklyn Teachers' Association from 973 educators, only 138 had tried the Batavia plan, and of these only 62 per cent favored it after trial.

THE NORTH DENVER PLAN.

The salient characteristic of the Batavia plan is that under it the best efforts of the teaching force are devoted to assisting the least hopeful members of the class. The interests of the ablest are sac-

One-half year progress.

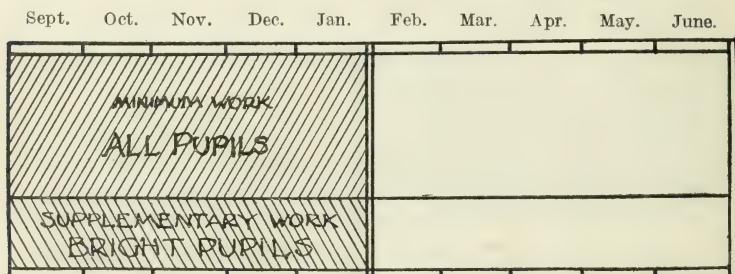


FIG. 2.—NORTH DENVER PLAN.—Diagram illustrates how equality of progress is secured through giving the bright pupils supplementary work, instead of giving the laggard pupils extra teaching.

rificed to those of the dullest. In sharp contrast to this is the North Denver plan. The object of the plan is to provide an opportunity for the brighter children to do more extended, more intensive, and more individual work than the other members of the class. This extra work is done by them during free periods, while the other children are reciting. Home work is minimized and the brighter pupils are trained to depend less and less on their teachers and given an opportunity to push ahead as rapidly as their capacities will permit.

Among the 973 educators who contributed to the study of the Brooklyn Teachers' Association, 169 had tried the North Denver plan, and of these 94 per cent favored it after trial. The chief virtue of the plan is that it places its greatest emphasis on assisting the brightest pupils. Its object is predominantly constructive rather than predominantly remedial.

THE CAMBRIDGE PLAN.

The plan long in use in the schools of Cambridge, Mass., is the best known of the different devices and systems for securing an opportunity for children of differing abilities to progress through the grades at different rates of speed. Its aim is to classify students according to ability and then to have the different classes or divisions go forward at rates appropriate to their varying abilities. Moreover, it brings the pupils of the different classes together at stated intervals and provides for reclassification. The mechanism of this plan is shown in the diagram, which illustrates how provision is made whereby a pupil may complete the work of the six grammar grades in four, five, or six years and is given opportunity to change from the slow to the fast division or vice versa.

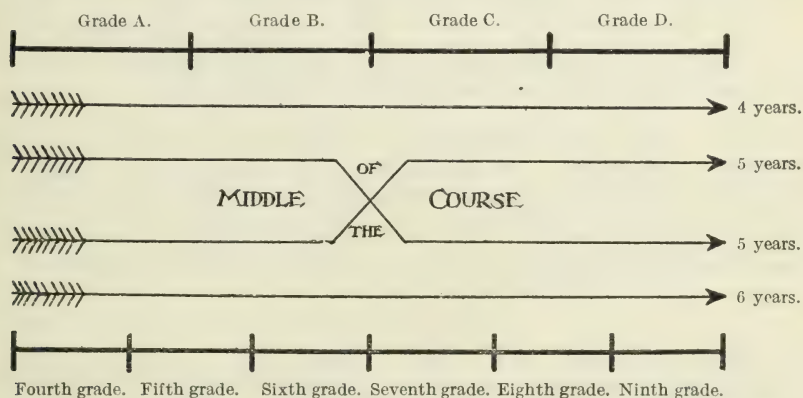


FIG. 3.—CAMBRIDGE PLAN.

Seventy-five of the 973 educators had tried the Cambridge plan, and 92 per cent of them favored it after trial.

LARGE-SCHOOL PLAN.

In New York, Chicago, and other cities a plan commonly known as the "large-school plan" has been in use for 15 years or more. The large number of pupils makes it possible to have three or more classes in each grade and the plan places the brightest ones in one class, the medium ones in other classes, and the slow pupils in still other classes. Each class completes the grade work as rapidly as possible so that the bright division may be promoted a month or two before the slow one. The chief virtue of this plan is that it makes possible close grading and the most just placing of each individual pupil. Its chief defect is that it is applicable only to large schools. Of the 973 educators above referred to, 111 had tried the "Chicago plan," which is virtually the large-school plan, and 93 per cent of them favored it after trial.

THE PUEBLO PLAN.

The most individualistic plan of grading and promotion that has ever been advanced is known as the "Pueblo plan." This plan provides that each pupil shall advance as rapidly as he can accomplish

One-half year progress.

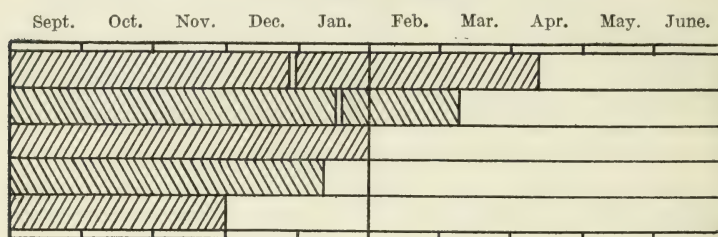


FIG. 4.—LARGE SCHOOL PLAN.—During the half year to which the diagram refers the brightest pupils (in the division represented at the top of the diagram) have completed the work of a term and a half. Each of the other divisions has covered less ground, the last one, at the bottom, having done little more than half a term's work.

his work. The individual and not the class is the unit in study, recitation, progress, and graduation. If groups are formed for recitation they are temporary. The teacher is a director of work, going from pupil to pupil. There is no home study. Among the 973 educators questioned, 207 had tried the Pueblo plan and 96 per cent

One-half year progress.

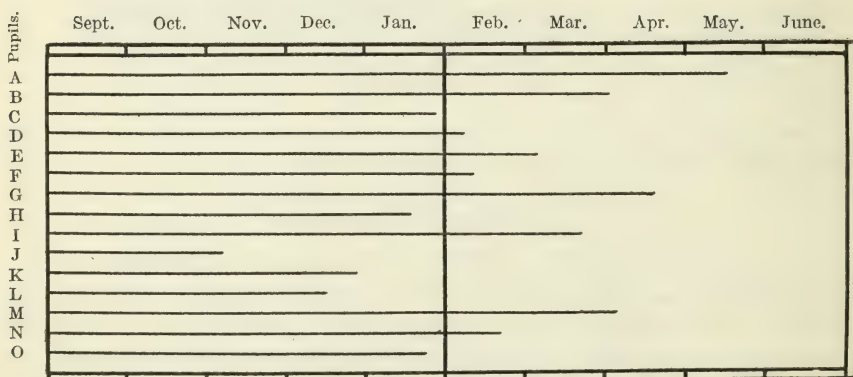


FIG. 5.—PUEBLO PLAN.—Each horizontal line represents the progress of an individual pupil, and their varying lengths show how pupil A has covered almost a year's work during the half year, while the slowest pupil (J) has done only about a quarter of a year's work.

avored it after trial. The chief objection against it seems to be that it is so intensely individualistic in nature that it can only be successfully carried out when teachers of unusual ability are available and they remain in their positions for considerable periods of time.

SUMMARY.

The first unquestionably valid conclusion which comes from a study of the various plans designed to secure flexible grading and promotion is that the "lock-step" system is prejudicial to the interests of the pupils. In this method of mass promotion, the individual is lost. Under it pupils are not so classified that the work given may be adapted to their individual abilities. It places the emphasis on the weak instead of on the strong, and so makes it difficult to shorten the elementary school period for the more able pupils.

There is no simple, ready-made plan for avoiding the evils of the lock-step system, and securing for each child that full opportunity to advance according to his individual ability that is the goal of the ideal school system. Every plan must be modified to meet local conditions. In many cities several modifications, and even several different plans, are needed.

There is general consensus of opinion that the object of a grading and promotion plan should be to bring together children of similar abilities and like capacity for carrying the work, so that each group shall be as nearly as possible homogeneous. Frequent opportunity should be provided for reclassification, so as to allow for changes in the ability of the child to carry the work, giving children who have been making slow progress opportunity to go forward rapidly, and, where necessary, those that have been making rapid progress opportunity to go forward more slowly.

The emphasis of the system, and the strength and efforts of the teachers, should be primarily devoted to assisting the bright pupils, rather than directed toward forcing forward the dull ones.

CHAPTER VII.

DESCRIPTIONS OF WORK DONE FOR EXCEPTIONAL CHILDREN IN AMERICAN SCHOOL SYSTEMS.

(Extracts and Summaries from Letters and Reports Sent by Superintendents.)

BALTIMORE, MD.

Classes for epileptics—Disciplinary classes—Parental schools.—Two special classes are maintained for educable epileptics. They attend school during the forenoon only. Car tickets are furnished for those living at a distance from the school. Twenty-four ungraded classes, chiefly for disciplinary cases, are maintained—one for each group of schools presided over by a single principal. These two forms of special classes are provided primarily for the relief of the regular classes. There is also a parental school for habitual truants.

Flexible grading.—The plan of grading in operation in the larger schools includes the grouping of children of the various grades into fast, medium, and slow classes. The fast classes are relatively large. The medium and slow classes are graded down in numbers as well as in ability in order that the teaching may be more and more individual as the slowest divisions are reached. The slowest are treated as special classes with the curriculum modified to fit individual needs.

Classes for gifted.—On completing the work of the sixth grade especially capable children, whose parents desire to have them do so, are allowed to take up extra studies of high-school grade, earning thereby credits which count toward the high-school diploma. Such children are able as a rule to complete the work of the seventh and eighth grades and the four high-school grades in five years.

Individual assistance.—Individual assistance is given to children who are backward in one or more studies by senior students in the training schools, who perform this service as a part of their course in the practice of teaching. They render valuable service, for which they receive a small compensation, and are benefited by the corrective effect of this individual work upon their natural inclination toward teaching the lesson rather than the child.

Dental clinic.—A dental clinic has been established in the parental school. The Society for Oral Hygiene has provided the equipment and the volunteer service. All pupils of the school have had their mouths examined and their teeth repaired. New pupils are treated

as soon as possible after they are committed to the school. Thus far the school board has been called upon only to provide a suitable room.

BAYONNE, N. J.

Disciplinary classes.—A special class is maintained for refractory boys. One of the immediate effects sought in the organization of this class was to relieve the regular classes of the presence of these pupils. Another was to cause a large number of pupils who were giving trouble to do better. Transfers are made in such a way that a boy is given a second trial in a regular class before entering the special class. Thus it is necessary to send only a small per cent of troublesome pupils into the class.

BOSTON, MASS.

Classes for subnormal.—Several special classes for subnormal children have been maintained. A special medical expert examines the children who are recommended by the principals for admission to these classes. Only improvable cases are accepted. Specially trained teachers are employed in these classes, and the number of pupils is limited in each class to 15. The course of study is exceedingly flexible, and is especially full of motor-training elements. Many pupils have been returned to the regular grades. Many others who have made small progress in the acquiring of knowledge have, however, established moral habits and acquired physical control sufficient to make them eventually self-supporting members of the community.

Disciplinary classes.—Two disciplinary classes have been established under charge of teachers especially qualified for this work. No more than 20 pupils are assigned to each teacher. With scarcely an exception, pupils whose school work and behavior under ordinary conditions have been valueless to themselves and detrimental to their classmates have become, in the disciplinary classes, interested in their work, and therefore obedient and punctual.

Ungraded classes.—In each district at least one ungraded class is authorized. In some districts, where a large number of immigrant children are learning to speak English, several such classes are conducted. These classes differ from regular classes primarily only in the fact that a smaller number of pupils are assigned to them (35). The instruction necessarily must be adapted to the conditions in the class, and the course of study is modified to suit these conditions. The purpose is to give special help to those pupils who need it and to return them as soon as possible to the regular grades.

Vacation school.—In the summer high school opportunity is given to secure additional points or to supplement the work of the regular

school sufficiently to enable the pupil to secure a passing mark. By this means pupils of exceptional ability may be able to shorten their high-school course by a year, and pupils who have failed to pass some part of their work during the year may make it up in the summer and thus graduate in four years instead of five.

Examination for defects.—Thirty-four school nurses are constantly employed in finding and correcting all forms of physical defects. The entire department of school hygiene is giving its attention to improving the health of the children. Every pupil is examined each year by the teachers for defects of eyesight and hearing.

Open-air classes.—In January, 1909, the park commission granted the school committee the use of two rooms and the roof of the refectory building in Franklin Park, and an outdoor class was started there on January 18, 1909. No pupil who has reached a contagious condition is admitted. A careful medical examination of each child is made by an expert every second week.

The schoolhouse commission has been requested to provide some of the new buildings with fresh-air rooms, so arranged that the heat may be shut off and the room filled with fresh outside air and flooded with sunlight. In these rooms pupils who would benefit from more fresh air may be seated with slight additional administrative difficulty and with no additional cost.

To wait until fresh-air rooms in new buildings are supplied in every district would postpone the benefits of fresh-air instruction for many generations. Much can, however, be done under the present conditions. An experiment conducted during the present year by the principal of the Prescott School illustrates the possibilities in any school. "With the advice and assistance of the school physician and the school nurse about 20 children who were thin, pale, anæmic, and repeatedly absent, were seated during pleasant weather in a cozy corner of the school yard, with portable desks, and under the charge of a special assistant. The regular work of the classroom was carried on in this outdoor class. This arrangement relieved the most crowded rooms and worked a most phenomenal change in the condition of the children who are in this fresh-air class."

CALUMET, MICH.

Ungraded classes.—Three "grading rooms" are maintained to take care of pupils who are more advanced in some subjects than in others. Ten or twelve pupils are placed in each room under a strong teacher. Some subnormal pupils are included in these classes.

CAMBRIDGE, MASS.

Open-air classes.—The open-air school is conducted in a dwelling house, remodeled and equipped for the purpose. The school will accommodate 27 pupils. During the first three months pupils were received on the recommendation of examining physicians of the Anti-Tuberculosis Association. Later, however, the pupils have been admitted on the recommendation of the medical inspectors of the schools and the visiting nurse, and they are returned to their regular classes when their physical improvement, as shown by a careful examination, is such as to lead the inspector and nurse to advise this action. The improvement in the general health of the children as indicated by complexion, appearance of the eyes, increase in strength and activity, has been noticeable. On entering the school each child is provided with a chair bag, a leg blanket, a soapstone foot warmer, a worsted toque, a pair of woolen gloves, and an outside coat. With this equipment the children are comfortable even in the severest weather.

CAMDEN, N. J.

Classes for subnormal.—The first special class established was somewhat experimental in character. Pupils were grouped about square tables the height of which is determined by the size of the children. Parents have consented to medical examination and treatment.

Operations have been performed by the hospital surgeons upon seven children, by a physician in his office upon two others, and four other children have received careful and continued medical treatment. All of those in the school during the last year have been given painstaking medical attention. In several instances, the treatment begun under the advice of the teacher has been continued by the physician at the request of the parents.

There are now four special classes for mentally deficient children, two others for average children whose mental condition is not strong, one distinctly disciplinary class, and two classes of institutional children, many of whom must be regarded as special.

CHICAGO, ILL.

Schools for crippled.—Crippled children are taught in two schools, to which they are transported free. Ten busses are used.

Parental schools.—The average membership in the Chicago Parental School in 1910 was 297, and the average period of detention six and a half months. The minimum term is a little less than four months. The time of parole is determined by the boys' behavior and the quality of work, outside pressure being disregarded. Boys are encouraged to earn their parole as quickly as possible, to guard

against the danger of being institutionalized and to make room for others on the waiting list.

After a boy has shown his capacity to do good work and to behave himself in the parental school, he is paroled to his home school. After parole he is carefully watched, and if necessary is visited by his teacher or family officer. Reports are sent to the parental school once a month by the principal, showing the boy's deportment and progress in his studies. If these reports continue good for the period of one year, the boy is recommended to the board of education for discharge from the custody of the parental school. During the period of parole, the boy may be returned upon the order of the superintendent of the parental school, for violation of the terms of his parole. About 18 per cent of the boys are returned; the remainder make a record from fair to excellent in their home schools.

Correction of speech defects.—Children with speech defects, stammerers and stutterers, are given special corrective exercises by members of the graduating class of Chicago Teachers' College trained for their particular work in the department of oral expression. Instead of gathering the children together into one building, the young teacher travels from school to school.

Cases of adenoid growths and of other difficulties in the speech organs needing surgical or medical attention are referred to the department of child study.

Psychological clinic.—The department of child study examines all subnormal children, and prescribes the kind of intellectual and physical training which the teacher in the subnormal center shall give the child. A program is furnished the teacher in each case by the department. The promotions to the grades are made after the examination by the department of child study. The membership in each subnormal center is limited to 20.

Classes for deaf.—In the classes for the deaf some attempts were made during the year 1910 to bring the deaf pupils more into contact with the hearing pupils in recitations and exercises than had been the custom. Deaf pupils were taken into classes of hearing pupils for construction work wherever possible. The absence of part of the class of deaf pupils from the special room enabled the teacher to devote her time exclusively to the remainder of the class; while the deaf pupils working with their hands along with the hearing pupils found their infirmity no bar to efficient work. Deaf pupils were sent to rooms of hearing children regularly or occasionally for recitations along with hearing pupils, the lessons having been prepared with the help of the special teacher. They usually returned from such exercises full of enthusiasm and eager to tell of the new things learned. While they gained little and gave to the teacher but little when compared with the hearing children, it was much for them, and they profited by it.

Instead of the department of child study spending time in making so large a number of examinations as formerly at school buildings—and that without much of the necessary apparatus and appliances—many more remote and widely separated sections of the city were served by appointments to meet the examiners at the offices of the board of education. Furthermore, by getting into direct communication with the parents or guardians who accompany the child to the office, suggestive information can be secured relative to the child's home, personal history, and in general the group of factors which influence unfavorably his progress in school work. All this, when found necessary, is supplemented by the subsequent report of the school nurse or social worker after having visited the home.

FROM "OPEN-AIR CRUSADERS," 1911.¹

Open-air classes.—In September two rooms were opened in the Graham School to show what natural cold air will do for normal pupils. No selection of individuals was made except that as children entered the school for their first year's work they were given their choice of entering a cold room or a warm one. Of course some pains were taken to inform the parents in advance as to what it was expected the cold air would do. After several weeks of trial in which zero weather was encountered and no bad effects followed, teachers, parents, and pupils, seeing what had been done for those in the two rooms, asked for rooms in the other grades for the same sort of work. The school year closed with seven open-air rooms.

So satisfactory was the work that the school opened in September with 20 cold rooms, merely retaining enough of the warm-air rooms to insure a place in a warm room in every grade for pupils whose parents desired them to have it and also a place for teachers to work in warm air in case some of them feared that work in a cold room might prove too strenuous.

The work in a cold room differs from that in a warm room. The pupils are exercised far more frequently and in the low grades the seats are removed so as to provide floor space for games and dancing. Common wooden chairs or kindergarten chairs take the place of seats, and long tables of simple construction replace the old form of rigid desks. The children sit in the schoolroom clad in the clothing which protects them on the way to school. They keep all that clothing on, if they choose, or lay aside their caps, mittens, overshoes, and coats if they feel uncomfortable with them on. During the year no money was paid out for any sort of clothing to protect

¹ *Open-Air Crusaders.*—Sherman C. Kingsley, 1911. Published by United Charities of Chicago. For free distribution.

the children from cold, as it was found that whatever clothing would bring them safely to school was more than enough for protection in the school, where games were frequent.

CINCINNATI, OHIO.

There are day classes for the deaf, for the blind, for foreigners, for the mentally defective, and for the retarded. The instruction of the blind is so carried on that the blind children have considerable association with other children. The mentally defective children are brought together in a convenient center, so that there can be some classification and much attention to manual work. Those distant from the center are conveyed to the school at the expense of the board.

School for backward.—A special school is maintained for slow children more than three years behind normal children of their age, but not mentally defective. In organizing this school a careful physical and mental examination was made of the children and their homes were visited. Such as needed medical attention received it. Glasses were provided and operations performed for adenoids. A truant officer reports each morning to look up absentees. The following advantages are claimed: All the causes usually assigned for backwardness are found to hold good here, but especially it has been found that the children had gotten out of harmony with school work and most of them were in school because they had been coerced by parents or school officers. On the street and in their games they were able to play their part, but in the schoolroom they had been grouped with children who, though much younger, surpassed them.

Now that they have been grouped with those of their own age, and work is assigned them that interests them, their attitude toward school has changed. They are classified in groups that average from 28 to 30 per teacher; the course of study has been modified to meet their special needs; they are given a great variety of handicraft and a half hour of physical training a day in the gymnasium. Under these conditions the children have become tractable and regular in attendance, and the progress they have made is encouraging to them and to their teachers. It has been demonstrated that under favorable conditions most over-age children not mentally defective can do creditable school work and become serviceable citizens.

The great advantage of collecting a large number of special pupils into one school over the old method of establishing an ungraded room in each school is apparent. Classification of groups of children with similar needs enables teachers to handle twice as many children with greater ease; the enthusiasm that comes from numbers is obtained; the teachers themselves have companionship and an opportunity to

interchange ideas and get counsel; and, above all, manual and physical training can be given in a systematic way that will lead to usefulness.

These teachers are paid only \$50 more than grade teachers. There is an advantage in this, for those who do not feel a genuine interest in such work will not be tempted to go into it because of money consideration. When teachers of special aptitude go into special work, they will not voluntarily leave it. There seems to be a fascination about it; every child is a problem; there is something distinctly interesting each day and hour; there is a continual call for sympathy, energy, skill, and tact; there is a feeling of unity and harmony and mutual helpfulness in the teaching corps; and, finally, there is the sense of mastery and the exultation of victory over the unusual. This seems to apply to the teachers in all types of schools for special children.

Special school for boys.—Pupils are sent to this school by the juvenile court or by the superintendent. It includes boys who are willfully and persistently absent from school and those whose conduct, while not criminal, is not amenable to ordinary treatment. The school is the last resort in school discipline. To a decided extent it has removed the necessity for corporal punishment. The number of cases of corporal punishment now is not one-half what it was five years ago. It is now restricted by stringent rules and can be administered only in presence of a third person.

The superintendent commits boys only to the day school. If this proves insufficient to break up truancy, the juvenile court commits to the detention department, where the pupil is kept at night, attending the school (in the same building) by day. Of those who were removed to other institutions only three were for truancy; that is, the school failed in only three cases. Almost all who have remained under its influence for some time have completely changed their ideas and their attitude toward organized authority. Most of them have gone out and lived up to their expressed intention to "make good."

Sixty per cent of those in attendance have been committed for truancy, 40 per cent for incorrigibility and other causes. About 60 per cent have been committed by the superintendent of schools and 40 per cent by the juvenile court.

All are given one hour in the shop, one hour in the gymnasium, and three hours in the schoolroom where emphasis is given to the commercial side of the essential branches and to drawing and writing. Most of the work is individual.

The discipline is so free as to create some criticism. There is a spirit of good will, however, that could not be obtained by a spying, cruel system of government. The teachers insist upon gentlemanly

behavior and try to secure it from properly cultivated motives rather than from forms and rules. The school is very popular with the boys who do not want to be sent back to their own schools. Parents frequently report that the boys behave much better and show more willingness to help. The purpose of the school is not punitive; it is to develop in the boys the power of self-government and a desire for self-control.

CLEVELAND, OHIO.

Ungraded classes.—Whenever a child, because of low mentality, bad home influence, nervousness, physical defects, or any other cause, falls behind, he is left with his regular grade and sent to the school for backward children in the study or studies in which he may need special help. These schoolrooms for backward children are not complete in themselves, but rooms to which those needing it are sent for special assistance.

Flexible grading.—Where conditions are favorable, schools are arranged into slow and fast grades. The differences in children are great, and to have the children of widely varying capacities in the same class is to the disadvantage of all, and especially to the disadvantage of the less capable. This is true even when the teacher seeks to give special attention to the slower pupils, for the stronger will invariably assume the leadership, and this tends to restrain and suppress the weaker. To organize schools where the conditions are favorable into slow and fast grades is then merely to place children of relatively equal capacity together. To equalize opportunities, 45 children are placed in the fast, and only 35 are assigned the slow grade.

The advantages of this plan for the strong children are: Instruction can be better adapted to their capacities; a broader range of facts can be considered, and a wider range given to the application of principles; instruction can be made more thorough and fundamental. On the other hand, the less favored children can be given work better suited to their abilities; the advance is slower and more carefully planned; there is greater opportunity to develop individuality and leadership, and to bring out whatever ability and latent capacity these children may have.

This plan or organization thus permits each to work according to his capacity, and while it adds to the strong, by making the slower grade somewhat smaller, it permits not only of a better adjustment of work to the less favored, but also of a greater amount of personal attention, and can not help being a factor in holding many a slow child in school and up to grade.

Vacation schools.—Vacation schools, open to all children of grammar and high school grades who have failed of promotion, are maintained for eight weeks in the summer. Responsibility for promotion of the pupil after having done this work is vested in the vacation teachers.

School for backward.—A new 20-room building in the center of a very congested district has been set apart for retarded children. There are 800 children in this school retarded one, two, three, or more years. It is planned to simplify the course of study and to give the work of this school a strong individual bias, to the end that part of these retarded children may make up certain of the time lost and be restored to their proper grade, and that the others may be advanced along lines suited to their abilities and thereby secure more of an education than would otherwise be possible to such children.

DENVER, COLO.

School for backward.—Two buildings have been set apart to which are sent children who are three years or more behind their grades. The demand is in excess of the capacity of these two buildings. The pupils enrolled are studied as individuals and every effort made to ascertain why time has been lost and how the difficulty may be overcome in each case. Other centers for retarded children are to be provided.

DETROIT, MICH.

Classes for deaf.—Forty-nine pupils were registered in the school for the deaf in 1909. A number of semideaf children were transferred to the deaf school at so early an age that much may be done to retain and develop speech.

In January, 1908, three pupils completed the eighth grade and were graduated. Two are attending the Central High School, where they follow the course of study prescribed for their hearing companions without special help. The third pupil, because of adverse circumstances, was compelled to assist in the support of the home. She is employed in the mail-order department of a large dry-goods store in this city. In January, 1909, a former graduate of the school for the deaf completed a high-school course. The success of these pupils has been a great incentive to the pupils of the grammar grades who are now planning for a high-school education. Detroit maintains a normal training department in connection with the school for the deaf.

FITCHBURG, MASS.

Special teacher for backward.—After several years' experience with the type of ungraded class in which children backward in one or more branches took all their work in the ungraded rooms, a change was made to a plan by which the child engages in general exercises in one of the regular grades, and comes to the special teacher about 20 minutes each day for special help in the troublesome study. This teacher has no other children to watch, no other work to supervise. The

special weakness of each child is considered, and the work planned accordingly. At least twice the number of children reached by the former plan can be reached by this plan. Fifty different children a day has been the highest number, 40 to 45 being the usual number.

Supplementary classes.—Pupils of the highest grammar grades, commonly known as “left overs,” many of them having been “left over” in previous years, are allowed to enter the high schools, forming a class by themselves, a single teacher being placed in charge of the whole work of the class, who lays out work for the pupils according to their individual capabilities. These pupils are able to pursue some of the studies of the high-school grade, although advancing less rapidly than the members of the other classes.

Provision is made in like manner for pupils from the various classes next below the highest grammar grade, these pupils standing in relation to the highest grammar grades in a position corresponding to that which those “left overs” from the highest grammar grades stood in relation to the high school. These pupils from the various grammar schools are united in one class and made a part of the highest grade in a way similar to that under which the special high-school class is organized and managed. Some members of the special high-school classes are able to do the work prescribed for the regular classes and some admitted to the supplementary grammar grade class make such progress as to gain admission to the high school with the regular class.

HARTFORD, CONN.

Open-air class.—The first outdoor school in Connecticut was opened in a tent on the grounds of the Sigourney School, on January 3, 1910. A floor was laid with a sand cushion beneath it and a wainscoting built about the sides of the tent to about 20 inches, affording protection to the feet of the pupils, all the air in the tent coming in from the upturned sides and not from the damp ground. The arrangement of the tent inside was like that of the regular schoolroom, with desks, blackboards, and other paraphernalia. Two teachers of experience in different grades of work were engaged to care for the school, and were eminently successful.

Through the cooperation of the Society for the Prevention of Tuberculosis, food, warm clothing, and medical examination and inspection were provided.

The children were selected from 13 different schools and from 10 different nationalities and numbered 47 before the season closed. When children had gained sufficiently, or home conditions had materially improved, children were sent home, at first, but later it seemed best to retain them as long as possible, in order to test not only the health-giving scheme of the school but the educational side as well.

All school children entering were selected from groups selected from schools and examined. They were first weighed, and thereafter tested on the scales weekly and a record kept of their weight at each weighing. Some of the records show remarkable gain, while others show steady upward progress.

The temperature in the tent has registered as low as 16° while the studies were in progress and no one seemed to suffer, protection to the feet being assured by heated soapstones in the sitting bag.

Most of the pupils were below grade in their studies. Under ideal conditions—small numbers, perfectly fresh air, nourishing food, rest, and exercise—they made much progress. One second-grade child who was in the outdoor school less than two months, upon her return to the regular school was put into the fourth grade. There were nine grades in the school. One teacher taught the first five grades; the other took the four remaining grades. When possible the classes were united. The backward pupils were greatly helped by reciting with several classes. Children who were poor in a certain branch were put into two or three classes of that branch. A child who was particularly good in a study was allowed to recite that branch with a higher grade. In every way the children were encouraged and not held back.

The children wanted to work, and to work hard, and wished to keep abreast in their studies with the children of the other schools. While they were unable to work hard in the other schools on account of ill health, they could do so in the outdoor school, where they improved rapidly in health, and where they studied under such favorable conditions.

HOUSTON, TEX.

Ungraded classes.—A special room is set aside for “exceptional pupils.” To this room are sent pupils who are not capable of learning in the ordinary class room, and yet who are not so deficient as to need to be committed to a State institution.

Many of them are physically defective. While in this room they have special medical care and attention. It has often happened that as soon as the child has received proper medical treatment he is able to go back into the regular room.

Such subjects as manual training and school gardening are especially emphasized. If a child can do good work in some one subject, as, for instance, reading, but not in others, an effort is made to allow him to progress as rapidly as possible in the subject which he can learn easily, and yet to lay enough stress on the other subjects. In some instances the pupil takes work on one subject with the normal children of a regular grade room, and takes work on another subject in this special class.

INDIANAPOLIS, IND.

Classes for gifted.—For the particularly able, special classes are formed at the beginning of the seventh grade, in which two years' work is accomplished in a year and a half. The relation between the lower school and the high school is such that strong work in the last year and a half or last two years in the grammar grades secures a half year's credit in the high school. These and other children may by exceptionally strong work in the high schools save another half year.

For children strong in mathematics and language, classes are formed at the beginning of the eighth grade, in which Latin and algebra are taken in addition to the regular work of the grammar school. Time for this work is provided for by diminishing the time for English and arithmetic. Strong work in these classes secures a half year's credit in the high school in Latin and algebra, and other credits may be secured by good work in other subjects to make up about two-thirds of a term's high-school work.

Special teacher for backward.—For children who are slow at their studies and need more help than the regular school-teacher can give, a special teacher is provided in about eight schools in the city where the need is greatest. This teacher helps during the term from 50 to 75 different children. These children are almost exclusively in grades two to five, inclusive.

Ungraded classes.—For children who are on the border line of the mentally defective, at schools where there is a sufficient number of them to warrant it (in grades two to five, inclusive), a special room is set apart with a special teacher. The teacher's task in these schools is to study carefully the individual, to help where she can to put the child on his school feet, and restore him to the regular school-room, if possible. The book work is given so far as the child can follow it, but manual occupations of various kinds are also introduced, and an effort is made to establish habits of self-control, etc.

School for backward.—For the decidedly mentally defective children, two schools have been established on opposite sides of the city. Specially trained teachers have been placed in charge of these schools. Membership is not allowed to exceed 16 pupils each. The work that is commonly pursued by schools of this character is pursued there—manual occupations, habit-forming exercises, and such book work as can be given.

Disciplinary classes.—For confirmed truant and delinquent boys a special school is provided. Here manual training is emphasized, and special standards of discipline are maintained.

Industrial.—In certain districts of the city, in the seventh and eighth grades conducted under the departmental plan of instruction,

from one-third to one-half of the time for both girls and boys is given to industrial work. The regular book work occupies the balance of the time. The pupils hold as high standard as they ever have held in their book work, although they are giving considerably less time to it. This kind of specialization will be extended from two schools the current year to three schools next year. Several other districts in the city would like to have it introduced as fast as the authorities see their way to doing it.

The expense for this kind of instruction is approximately \$6 a pupil more than the exclusively book-work plan.

The general plan of development of this kind of work involves adapting the industrial phases of the work to the life of the community in which the school exists; therefore the lines of activity are different in different schools.

JOPLIN, MO.

Individual assistance.—Teachers of first-grade classes dismiss all pupils less than 7 years of age at 11 and 3 o'clock, and spend the remaining time working with the older pupils. Teachers of second-grade classes dismiss all pupils under 8 years of age at quarter past 11 and quarter past 3, and devote the remaining time to the older pupils. This work with the older pupils is not on the regular lessons, but on back work or such irregular work as will bring up retarded pupils or help others on to the next higher grade. Above the second grade the work with retarded pupils is done mostly by pupil teachers who devote one-third of their time to this work.

Special rooms, superior as to light and ventilation, are set aside for the physically defective. Weaklings are kept in cool rooms and given special exercises conducive to health.

LINCOLN, NEBR.

Classes for gifted.—Provision is made for unusually gifted children by placing them in a special room after the completion of the sixth grade. In this school during two years they complete the work of the elementary school and also the first year of high-school work.

A plan is being worked out whereby the dull and deficient children will receive proper attention.

LOS ANGELES, CAL.

Ungraded classes—Parental schools—Classes for deaf and dumb.—Special classes include the following: Ungraded rooms open to all elementary school children who are at a disadvantage in the grades; special ungraded rooms open to truants and incorrigibles; foreign ungraded rooms for the newly arrived immigrants; a detention house and parental republic at the service of the juvenile court; one trade

class, giving work in carpentry, sewing, and cooking, the pupils devoting half a day to the study of books and half a day to industrial training; two classes for deaf and dumb, taught by oral method; and one day nursery. This last is housed in a building furnished by the school department and standing on ground furnished by the school department, but in all other respects it is in charge of the Parent-Teacher Association of the city. It takes the babies of poor people and takes care of them during the school day. It is located in a Russian settlement where poverty compels the parents to go out to work. The school law compels the older children to go to school. This would leave the baby at home or else compel an older child to bring the baby to school. Out of necessity has grown the above-mentioned day nursery.

LYNN, MASS.

Individual assistance.—In all of the larger graded schools special teachers are employed who work with backward pupils and also with exceptionally capable pupils. There are special classes for foreign children. In these classes are found children of all ages who are just learning the rudiments of English.

MILWAUKEE, WIS.

Classes for the blind.—In each of 3 schools, situated in 3 different sections of the city, a room is set aside for the use of the blind pupils, who come in charge of parents or guides, on the street cars, or otherwise, as their parents arrange. Those who live long distances from the school usually come in charge of a brother or a sister or a little friend of school age, who accompanies the blind child as a regular pupil, and who usually enters the school in which the class for blind children is taught.

The blind children gather first in the room specially provided for them; they then go to the regular schoolrooms, where they remain during the opening exercises of the classes to which they belong. After the opening they return to the special room to study their lessons. At recitation time in any class the blind children who belong to that class go from their special room to the regular class room and there take part in the lesson as the seeing children do. They use the same textbooks, which are printed for them in point letters (American Braille being the point system used), reading or spelling or solving the question in arithmetic in their turn. After the recitation is completed the blind pupils return to the special room and there do their studying under the oversight of the special teacher for the blind. One of these has charge of each of the rooms and acts as helper and special teacher.

The number of pupils which the teacher of such a group can care for properly is from six to eight, this depending somewhat on the age of the children and on other considerations.

These schools are under the direct management of the board of school directors, according to the provisions of an act passed by the Wisconsin Legislature. This act authorizes the establishment of day classes for the blind in connection with the public schools of cities and provides that for each pupil in average daily attendance in such cases the State shall pay to the school board maintaining such a school the sum of \$200 per year. This sum is to be used for defraying the expenses of instruction, including salaries of teachers, cost of books and materials for manual training and other lessons, and to pay car fare for children who live long distances from the school. It is also used to cover the cost of instruction in some industrial employment or in music, according to the aptitudes of the different pupils.

Classes for subnormal.—A class for exceptional children has been used as an experiment station to ascertain in just what way it is practicable to deal with children who are somewhat subnormal intellectually, and to establish rules for guidance in deciding what children can profitably be instructed in classes of this kind. Early provision will be made for the entire 300 or more now in the schools.

Ungraded classes—Non-English speaking.—There are 12 ungraded classes. They are primarily classes of opportunity. They are not designed for dull or stupid or unruly or subnormal pupils; they are intended chiefly for children who are considerably above the age of the classes in which they are found and who should have given to them some opportunity to make up the lost ground and to get into a class with children of their own age and general attainments. These classes are much used for young foreigners who do not have a knowledge of English; for boys and girls who come in from other schools or from other cities, and whose teaching has been of a different kind, so that they do not fit into the regular grades of the schools; for boys and girls who have been out of school or who have had poor educational advantages and so are two or three or four years behind the grade in which they should be.

The ungraded classes are used to some extent also for apparently average pupils who have not been able to get along in the regular classes. These children, when put into the ungraded classes, are put there chiefly in order that they may be studied, and that the teacher and the principal may be able to decide what is the cause of the pupil's backwardness.

MINNEAPOLIS, MINN.

Stammerers.—A school for stammerers, undertaken by a competent teacher for two months, was so successful that the board engaged the teacher for an additional term of two months to instruct another set of pupils. The superintendent recommends the continuance of the work.

Ungraded school.—An ungraded school, centrally located, in 1910 received 191 pupils from 43 different schools. A pupil sent to the ungraded school is required to remain at least one month before he can be transferred to one of the regular buildings.

NEWARK, N. J.

Ungraded classes.—Several ungraded classes have been maintained, in which those children are enrolled who, through chronic truancy or persistent misconduct, are not considered fit to remain in the regular grades. For the better accommodation and training of these children two buildings are to be erected on opposite sides of the city. Each building is to contain, besides the principal's office, two classrooms suitable for the accommodation of 25 pupils each, a gymnasium, shop, and shower baths. A kitchen and proper dining-room facilities will also be provided. The sites will be spacious enough, it is hoped, for playgrounds and for school gardens.

Both these buildings are expected to be models of their kind and such as to afford the boys who attend these schools all the facilities needed for a rational training. The shop and the gymnasium features are believed to be needed to train the boys in useful habits of industry and in health and soundness of body. The kitchen feature is intended chiefly to enable the teachers in charge of the school to keep the boys on the premises during the noon intermission. Lacking this feature, it has been found necessary to allow the boys to go on the street in the noon hour, which has often resulted in their engaging in mischief or in making themselves a nuisance to the residents of the vicinity. It is thought that their retention at the school during the whole school day will serve to strengthen the habits of good behavior that the school seeks to attain as one of its main ends. Again, their retention at the school during the noon hour will afford an opportunity at lunch and in the recreation period on the playgrounds to teach lessons of appropriate social behavior which boys of this kind generally lack. Manliness of conduct, fair play, cooperation, consideration for the rights of others, sympathy, kindness, etc., are important social and civic habits which need specially to be emphasized in a school of this kind.

Schools for feeble-minded children, for the blind, for the deaf, for the crippled, and open-air classes for anemic children are planned.

NEW BEDFORD, MASS.

Ungraded classes.—Ungraded classes, started as an experiment, have become a fixed part of our organization. While these classes are planned for illiterates and the course of study followed is such as will enable the pupils to meet the legal requirements for a work certificate, many pupils have been transferred to the regular grades and have done good work. One boy, who entered one of these classes three years ago, is now in the freshman class at the high school.

NEW HAVEN, CONN.

Disciplinary classes.—Rooms are set apart for two classes of children, viz, the refractory and non-English speaking. The rooms for the refractory are in the hands of men teachers, and each room has from 15 to 25 pupils. At present the chief value of these rooms is said to be that refractory children are removed from other schools.

Non-English speaking.—Non-English-speaking children are taken into special rooms as soon as they reach the city. The ages of the children vary from 5 or 6 to 13 or 14. The number constantly varies on account of the irregularity with which they reach the city and also the necessary irregularity with which they are promoted to grade rooms.

NEWTON, MASS.

Ungraded classes.—Special classes are maintained for backward and peculiar children, and unassigned teachers work with individuals in the regular classes who need special attention.

NEW YORK, N. Y.

In New York, when a case of truancy or incorrigibility develops, the usual method of procedure is as follows: The boy is suspended by the principal, after giving him many warnings and trials under different teachers. Official notice is sent to the parent and to the district superintendent. Parent and child are summoned to appear before the district superintendent. If upon investigation it is evident that the parent is to blame, warning is given the parent that the next offense will result in a summons to the magistrate's office and consequent fine. Whether parent or boy be in fault the boy is, if possible, transferred to another school, the principal of which is informed of all the circumstances in order that he may place the young offender where he will receive proper watching and care. The boy is also required to present at the district superintendent's office every Saturday a parole card giving a record of his daily attendance and conduct.

Parental schools.—In the vast majority of cases this procedure is effective. If it fails, parent and child are again summoned to the

district superintendent's office and previous threats of commitment to the parental school are carried out. The accommodations at the parental schools are not proportionate to the school population. For this reason a special disciplinary school is provided. The same course of study is followed as in the regular schools, with the exception that greater emphasis is placed upon physical training and manual training. The school is large enough to permit the same grading that is followed in other schools. There are more than 100 special classes for mental defectives and 23 classes for crippled children. For these the board of education furnishes rooms and teachers. Nurses, luncheons, medical treatment, and transportation are furnished through private philanthropy.

Classes for the deaf and the blind.—There is a school for the deaf, with an attendance of 160 children. Blind children are taught in the regular classes with seeing children. Car tickets are provided for each child and his attendant when the distance from his home to the school is considerable. A teacher from the regular force gives her time to the blind children attending a given school, but after the children have acquired some proficiency in the use of the Braille slate and Braille typewriter they are sent to the regular graded classes. Books, maps, and charts in raised type are provided by the school authorities.

Open-air schools.—Day camps or open-air schools have been provided on abandoned ferryboats and elsewhere for tuberculous and anemic children, the school board providing teachers, books, and supplies.

Non-English speaking.—Classes for non-English-speaking children accommodate about 1,200 children. About 1,500 are cared for in classes for the mentally defective, and twice as many in classes for children who will shortly reach the limit of the compulsory-attendance period and are preparing to take their work certificates. More than 20,000 slow children are cared for in so-called "Rapid progress classes," in which they are given the advantages of skilled teachers and abridged and amended courses of study.

OAKLAND, CAL.

Classes for deaf.—Special classes are maintained for the deaf and for those who fail to keep up in the grade work. Saturday morning classes are maintained for those who are not able to attend school during the entire week. In connection with medical inspection, free clinics have been provided for the benefit of those children whose parents are not able to contribute full pay for services rendered.

PHILADELPHIA, PA.

School for backward.—The first special school for the truant and incorrigible was established in this city in 1898. The number of such schools has grown to 9 at present date. The first class for backward children in a regular school was established in 1901. The number of such classes has grown to 6, and one school of 6 classes has been organized as a special school for backward and mentally deficient children only. With but two exceptions the special schools, though originally intended for the truant and incorrigible only, have by a natural classification of the pupils attending them been organized for backward and mentally deficient children also. The schools, however, are small, varying in size from but 2 to a maximum of 7 classes, and make provisions for only 1,000 pupils. There are in all 23 disciplinary classes with an enrollment of 458 boys, and 25 backward classes (6 of these are in regular schools) with an enrollment of 350 boys and 107 girls.

READING, PA.

Disciplinary class.—Two schools, one for pupils physically and the other for pupils socially not fitted to the grades, are now in operation. Since their opening in the spring of 1907, 60 boys and girls have been enrolled in the former and 111 in the latter. The results have been gratifying. Of the 111 that failed to attend punctually in the grades, 48 are now regularly employed, 23 have been returned to the grades, 13 have been transferred to other institutions, 7 have removed from the city, 1 has died, and 19 are now in the special school. The effect of this school has been felt upon the entire pupil body. Since its establishment the number of suspensions has decreased 75 per cent, and chronic truancy has lessened 80 per cent. In fact, truancy now reported is confined almost entirely to half-day and day cases.

ROCHESTER, N. Y.

Classes for subnormal and for gifted.—There are 16 classes for subnormal children in different sections of the city. The work of one supervisor and one medical inspector is limited to this department. Non-English-speaking children and delinquent children are grouped in a similar manner. Capable children in the eighth grade earn high-school credits in civics, English, algebra, Latin, and German. Seven teachers devote their time to pupils who are deficient in reading, arithmetic, and English.

ST. LOUIS, MO.

School for backward.—Two classes of exceptional children receive special attention—the deaf and the extremely backward. Children incapable of doing either the kind or amount of work that slow

children of normal intellect can do are brought together in small two-story houses rented for the purpose. Transportation is furnished to those children whose homes are not within walking distance. Each house accommodates two classes of 15 children each. There are two teachers in each center, and a woman attendant who lives in the building and takes care of the heating and cleaning.

SALT LAKE CITY, UTAH.

Psychological clinic.—A class for subnormal children has been planned which will serve quite as much the purpose of a laboratory for the study of such children as a place for their instruction. A teacher of experience, a university graduate with special training, will have charge, and will secure the cooperation of the department of psychology and the department of medicine of the State University.

SCHENECTADY, N. Y.

Non-English speaking.—Foreign-born children are taught in separate classes until they acquire a working knowledge of English, when they are regraded according to their proficiency in other subjects.

The number of children who are over age for their grades is determined annually. Where physical defects are found, the child is placed under the care of the board of health. Where no physical defects are found the child's progress is hastened by placing him under a special teacher who gives her time to backward pupils.

SOMERVILLE, MASS.

Dental clinic.—In addition to a class for children of less than normal mental power and an ungraded class in which children remain a few weeks to make up deficiencies, a dental clinic has been organized through the voluntary services of 25 dentists who give their services without charge to the city for the treatment of school children who could not otherwise have the treatment. While the results are gratifying, it is probable that it will be necessary for the school board to cooperate in some elements of expense if the undertaking is to be made permanent and thoroughly satisfactory.

SPOKANE, WASH.

Parental schools.—A parental school is maintained, occupying a farm of 40 acres, 5 miles from the city. The board of school directors bought the land, cleared it, erected for the accommodation of 25 boys a cottage containing dormitories, kitchen, dining room, laundry, attendance rooms, library, manual-training rooms, lavatories, etc. They also provided for a schoolhouse, detached barns, chicken houses, ice house, reservoir, electric-light plant, irrigation system, wells, etc.

The boys have a teacher for the regular school work, and, in addition to this, receive instruction in woodwork, gardening, and horticulture.

A fine stream traverses the property, affording facilities for swimming, boating, irrigation, and ice supply.

The boys are committed by the superior court on recommendation of the attendance department of the public schools.

The life on the farm in almost every case works a complete transformation of the boys, because it puts them in proper environment and gives them the right interests.

Though in operation but one year (1910) the school is crowded. More cottages will be added very soon.

Ungraded classes.—In the city there is an ungraded class of boys living at home who do not fit into the regular school organization. These boys receive individual instruction to a large extent and considerable manual training. It is planned to give a still greater proportion of shopwork to these boys.

The results of this class have been most encouraging because the boys have been given new interest where before they had none.

The establishment of a school for subnormal and other defective children is contemplated.

SPRINGFIELD, MASS.

Ungraded classes.—Five rooms are set apart for children who are backward in one or more studies and for children who can not speak English. The enrollment per room is limited to 20 pupils.

Classes for subnormal.—One special class is maintained for mentally defective children. The membership is limited to 14. Low-grade cases are not admitted. The hours of attendance are 5; 3 in the morning and 2 in the afternoon. Car tickets are furnished to those pupils whose homes are not within walking distance. Approximately two-thirds of the day is given to physical, manual, and sense-training work. Kindergarten methods and materials are used for those who need them, and the regular work done in Grades I and II is attempted, viz, reading, writing, spelling, number, drawing, singing, telling of time, story-telling, and dramatization, the emphasis being laid on object teaching and personal experience.

The teacher of this class for defective children has had special training for her work, and she is frequently called upon to examine retarded children in the various schools of the city and to determine, if possible, the reason for their retardation.

Arrangements have been completed for maintaining an open-air school for anemic children on the grounds of a centrally located school building. The enterprise is cooperative, the Association for

the Prevention of Tuberculosis furnishing the tent, the extra clothing, the food, and the care, and the school committee supplying the regular school equipment and the instruction.

WILLIAMSPORT, PA.

Flexible grading.—The schools are divided into fast and slow divisions. A particularly slow division is taught as a special class.

Work for physically and mentally defective children is contemplated, but not yet definitely planned.

WOONSOCKET, R. I.

Non-English speaking.—Two classes have been established for the instruction of non-English-speaking children in which 51 children have been enrolled. Thirteen understood practically no English, 10 understood a little, and the others had been in the city schools two or three years, but seem to have made but little progress. Each school-room has a map of the United States and the American flag. The books are the same as those used in the evening schools and were prepared especially for non-English-speaking pupils. Objects and pictures are freely used and as the new words are learned the pupils are taught to use them in sentences and responses. Besides reading the pupils have had conversation, dictation, spelling, numbers, map questions, and language work.

Of the seven most advanced, one came direct from France and understood no word of English. Another of those making good progress had come here only a few weeks before entering school.

The children seem to be interested, and most of them learn very rapidly. Many of them go to work as soon as they are 14, and they seem to want to learn as much English as they can before leaving school.

WORCESTER, MASS.

In the reclassification of the special and ungraded classes in the Worcester schools there has been an attempt to classify for the present as follows:

Non-English speaking.—Those of normal ability having a knowledge of subjects in their own language, but who, because foreign born, have not a command of English. Where two classes existed in the same location they have been redivided according to age, separating the older from the younger children. For these the stress is on the English language, ability to read and write it, and the special class is a grading room, whence the pupil soon passes to a regular class. It is a question whether these should be included among the so-called special classes.

Ungraded class.—Children of normal ability but temporarily retarded in one or more subjects by some of the previously mentioned causes. For such the special class is a clearing house, whence they pass to a regular grade.

Class for feeble-minded.—Children slow to understand, of naturally inferior intellectual ability, so constituted nervously as to be unable to profit by mass teaching; their progress slow but steady.

Class for mental defectives.—In addition to these last are those so deficient as to be entirely incapable of profiting by ordinary school methods, yet it is the task of the school to make the most of existing mentality.

Class for the physically defective.—A class of normal children suffering retardation because of some physical defect, such as seriously defective vision or hearing.

Classes for gifted.—In addition to the foregoing, exceptionally capable children are brought together into convenient centers, where they take up extra studies of high-school grade along with those of elementary grade, thus shortening the high-school course.

CHAPTER VIII.

THE SELECTION AND TRAINING OF TEACHERS.

The best advice that can be given to the superintendent of schools who appreciates the necessity of organizing special classes, and who is desirous of introducing them, is to proceed with that he finds nearest to hand. It would be a mistake for him to wait until he has ascertained the whole number of backward or of physically and otherwise exceptional children, and then attempt to introduce a complete organization to meet the needs of all. The number of such children will be found to be much larger than the superintendent has dreamed; the expense will be much greater than the school board will be likely to assume in connection with a new enterprise in education. Moreover, it would be impossible to find anywhere in the United States a sufficient number of adequately trained teachers to meet the needs of the large number of different types of exceptional children.

In one school system it might be desirable to begin with a school for the deaf, in another with a school for crippled children, in another for disciplinary cases—depending upon the immediate and most pressing necessity in each school system. In most communities schools for truants and disciplinary cases have been relatively more firmly established than schools for other types of exceptional children. This is undoubtedly because of the bad effect of these “moral” cases upon class-room discipline.

Our advice would be to organize one class at a time, to organize it with reference to the needs of the children who have been discovered in the school system, and to organize it with some reference to the special teacher who is to have charge of it. The best provision to make for the teaching is to assign some member of the school system, perhaps a teacher of experience in primary work, who has shown an aptitude for the handling of individual cases. There is a difference between class-room instruction and individual teaching. Many admirable class-room teachers, perhaps even the best of them, will not be especially serviceable as teachers of individual cases. The teacher must have her mind on the physical and mental make-up of each child, and her interest must be not in the teaching of school branches but in getting the child to make the next step forward.

The best training of these teachers must come from actual experience. Perhaps as good a plan as any is to select a good teacher,

give her a limited number of children, and let her work out her own salvation, for the first year at all events. After she has had some experience with such work, so that she knows her limitations and knows to some extent what she needs, it would be well for her to begin to add to her professional equipment.

The subjects in which she most needs instruction are hygiene, physiology, psychology (with special reference to the various types of defective children), and, so far as these are known, the best methods of conducting the work with different types of children. It is not to be expected that any one teacher can fit herself for work with all classes of children. For example, one teacher may be especially well equipped for articulation work; whereas another teacher may be poorly equipped for this work and yet be very successful with the ordinary backward cases.

Special training should be given to those teachers who are going to do what is, after all, the most important work for exceptional children—the training of those children who have fallen behind their grades, but who are yet capable of catching up. What is needed here is hurry-up work, forcing work; and the teacher requires unusual teaching ability and a special equipment. What is needed for this kind of work is not a knowledge of the methods of training feeble-minded children, but a knowledge of expert methods of encouraging normal mental development.

There is no one institution which offers all of the varied training which a teacher of exceptional children may require. The first training offered for public-school teachers of backward children, so far as we know, was offered by the department of psychology of the University of Pennsylvania, in the year 1897, in the summer-school course. Before this, teachers had been trained for the teaching of deaf children in the public schools, notably in Chicago and Milwaukee. Since then the Vineland (N. J.) Training School for Feeble-minded Children has put its resources at the disposal of the teachers of this country and is doing admirable work. All this and more is needed. The public schools of this country require a training school for teachers where all lines of special work will be adequately represented. Science—many different branches of science—and practice with all the common types of exceptional children must afford highly gifted and well-trained teachers the means of adding to their professional equipment what will make of them “educational experts,” who will render service to their communities not only as the teachers of exceptional children but as the advisers of ordinary teachers and administrative officers and as contributors to what has been termed “orthogenics”—the science which deals with the study and treatment of mental and physical defects obstructing and retarding normal development.

Cities reporting but not stating any provision for exceptional children.

Alabama.—Florence, Gadsden, Girard, Huntsville, New Decatur, Selma, Talladega.

Arkansas.—Paragould.

California.—Napa.

Colorado.—Canon City.

Connecticut.—Norwich, Southington.

Florida.—Pensacola, Tampa.

Georgia.—Albany, Americus, Elberton, Rome, Savannah.

Illinois.—Alton, Belleville, Blue Island, Champaign, Charleston, Clinton, Edwardsville, Elgin, Freeport, Galena, Jacksonville, Litchfield, Kankakee, Mendota, Monmouth, Mount Carmel, Normal, Ottawa, Taylorville.

Indiana.—Alexandria, Bedford, Bluffton, Garrett, Gas City, Jeffersonville, Lawrenceburg, Linton, Logansport, Madison, Montpelier, Portland, Rushville, Warsaw.

Iowa.—Albia, Cedar Falls, Crexton, Fort Dodge, Keokuk, Mason City, Missouri Valley, Oelwein, Oskaloosa, Washington.

Kansas.—Arkansas City, Cherryvale, Concordia, Galena, Independence, Rosedale.

Kentucky.—Frankfort, Madisonville.

Louisiana.—Lake Charles, Monroe, Shreveport.

Maine.—Belfast, Gardiner, South Portland.

Maryland.—Salisbury.

Massachusetts.—Blackstone, Middleborough.

Michigan.—Albion, Coldwater, Holland, Ionia, Marshall, Niles, St. Joseph.

Minnesota.—Moorehead.

Mississippi.—Columbus, Corinth, McComb, Meridian, Vicksburg.

Missouri.—Boonville, Independence, Maryville, Rich Hill, Springfield.

Montana.—Anaconda, Helena.

Nebraska.—North Platte.

New Hampshire.—Exeter, Franklin, Keene, Rochester.

New Jersey.—Hackensack.

New York.—Ballston Spa, Bath, Corning, Lyons, Matteawan, Medina, Middletown, Oneida, Ossining, Oswego, Owego, Plattsburg, Potsdam, Seneca Falls, Tonawanda, Waterloo, Wellsville.

North Carolina.—Burlington, Concord.

North Dakota.—Bismarck, Minot.

Ohio.—Alliance, Defiance, Piqua, Troy, Wapakoneta, Washington, Wellsville, Wooster, Xenia.

Oklahoma.—Perry, Shawnee.

Oregon.—Baker.

Pennsylvania.—Ashland, Bloomsburg, Carbondale, Catasauqua, Clearfield, Coatesville, Columbia, Conshohocken, Dickson City, Lock Haven, McKees Rocks, Middletown, Millvale, Northampton, Oil City, Peckville, Pitcairn, Pottsville, Renovo, Rochester, Sharon, Tamaqua, Tarentum, Towanda, Waynesboro, Wilkesburg.

Rhode Island.—Coventry, North Kingston, Pascoag, Warren, Warwick.

South Carolina.—Chester, Florence, Laurens, Rock Hill.

South Dakota.—Aberdeen.

Tennessee.—Bristol.

Texas.—Beaumont, Corsicana, Ennis, Gainesville, Greenville, Hillsboro, Martin, Palestine, Sherman, Temple, Waxahachie.

Virginia.—Fredericksburg, Suffolk.

Washington.—Bellingham.

West Virginia.—Clarksburg, Wheeling.

Wisconsin.—Baraboo, Waukesha.

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Devoted to the interests of children requiring special care and training. The organ of the Training School for Backward and Feeble-minded Children, Vineland, N. J. (About sixteen pages per number.)

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THE EDUCATIONAL SYSTEM OF CHINA AS RECENTLY RECONSTRUCTED

By HARRY EDWIN KING
VICE PRESIDENT OF THE PEKING UNIVERSITY



WASHINGTON
GOVERNMENT PRINTING OFFICE
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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, D. C., September 2, 1911.

SIR: I have the honor to transmit herewith a monograph on The Educational System of China as Recently Reconstructed, by Dr. Harry Edwin King, vice president of the Peking University. This monograph was originally submitted to the faculty of the department of literature, science, and the arts of the University of Michigan, and accepted in partial fulfillment of the requirements for the degree of doctor of philosophy. Dr. King's information was derived largely from his personal observation during long residence in China, supplemented by translations of Chinese documents. This work was accomplished with the assistance of Chinese teachers and students, some of whom have since become associated with Dr. King as instructors in the Peking University. I recommend its publication as a number of the bulletin of the Bureau of Education.

Very respectfully,

P. P. CLAXTON, *Commissioner.*

THE SECRETARY OF THE INTERIOR.

THE EDUCATIONAL SYSTEM OF CHINA AS RECENTLY CONSTRUCTED.

INTRODUCTION.

When we think of China, with a history dating back more than 4,000 years, with a national literature not excelled by that of any other ancient people, a system of government conducted by her ablest scholars, chosen for more than 12 centuries by competitive examinations, we are not surprised to find her characterized by a spirit of self-confidence. By reason of her early development in culture and in government, she became the teacher of neighboring countries, and invariably compelled her victor to adopt her language, literature, customs, and laws, literally absorbing the conqueror and making him lose himself among her people.

With her 4,277,170 square miles of territory, occupying geographically one of the most favored portions of the globe, having such a diversity of climate and such fertile soil, she has been able to provide not only the necessities but also many of the luxuries of life, and has made content her 400 millions of people.

Secluded by sea, mountain, and desert from contact with outside nations, she has been left alone to develop her own social, moral, intellectual, and governmental institutions. To quote Capt. Brinkley: "No other nation has preserved its type so unaltered; no other nation has developed a civilization so completely independent of any extraneous influences; no other nation has elaborated its own ideas in such absolute segregation from alien thoughts; no other nation has preserved the long stream of its literature so entirely free from foreign affluents; no other nation has ever reached a moral and national elevation comparatively so high above the heads of contemporary States."¹

China has a right to glory in her ancient civilization, which has produced some of the most learned sages the world has ever known. Her longevity has been due largely to the teachings of her ancient sages, her reverence for the past, her educational system, with its one object to provide able men for the State, and her civil-service examinations, which determined who were worthy to rule.

¹ Oriental Series: Japan and China. Vol. X, p. 1.

Confucius warned his disciples to "walk in trodden paths," and these loyal disciples have proclaimed, "What Confucius teaches is true; what is contrary to his teaching is false; what he does not teach is unnecessary;" and Kang Hsi (1662-1723) also urged his people to "discard strange doctrines in order to glorify the orthodox teaching."

The competitive-examination system has done more than anything else to make the officials and literati oppose the introduction of "western learning." Under the old educational régime China can not be said to have possessed any Government schools. All education was left to private effort, but literary attainment was decided by the Government through its system of competitive examinations, and rewarded by official recognition. Coming into forced contact with European powers, China has slowly discovered the fact that in order to preserve her national existence she must modify her educational system, and instead of devoting all her attention, as formerly, to the study of the classics, she now seeks also to understand the literature, sciences, arts, laws, and governments of western nations.

It is not the province of this thesis to enter into a discussion of the old system of education nor to attempt to treat the excellent educational work done in the mission schools and universities—a work that has up to date been the most efficient of all educational work done in the Empire. It has been a great object lesson and a great factor in hastening on the new education in China. To it is due more than to any other cause the establishment of Government schools for girls. It has furnished many native teachers for the Government schools, and many of the presidents of the first Government colleges and universities have been men who had been engaged in missionary education. Among them are the well-known names of Drs. Martin, Tenney, Ferguson, Hayes, and Richards, and Messrs. Duncan and Soothill.

We purpose first to trace the growth of the first national educational institutions and the struggle over the introduction of modern education into China before the formation of the ministry of education.

Second, to treat of the present educational system as outlined by the ministry of education.

CHAPTER I.

THE GROWTH OF MODERN EDUCATION IN CHINA UP TO 1898.

China's contact with foreign nations, the misunderstandings and conflicts she encountered, ending often in unsuccessful wars, convinced her finally that she had need to learn from the western world.

Dr. Martin tells us that "within less than a year from the close of hostilities in 1860 large bodies of Chinese troops might have been seen learning foreign tactics under foreign drillmasters on the very battle grounds where they had been defeated. Arsenals, well supplied with machinery from foreign countries, were put in operation at four important points, and navy yards were established at two principal seaports where native mechanics were taught the construction of steam gunboats."¹

The treaty of 1860 called into being the "tsung-li-yamen" or "foreign office." One of the provisions of the treaty required that all dispatches for the period of three years should be accompanied by a Chinese translation, thus giving the Chinese Government time to provide competent native interpreters. Almost immediately afterwards the yamen memorialized the Throne advocating the establishment of a school for the training of official interpreters. Now for the first time it dawned upon the minds of Chinese officials that unless they became conversant with foreign affairs, and understood foreign languages and literature, it would be impossible to protect the nation from becoming the victim of crafty imposition. This led to the establishment of the Tung Wen Kuan in Peking in 1862. Prior to this in 1861 Prince Kung had sought to secure as teachers Chinese competent to give instruction in foreign languages. Failing in this, he was forced to seek the aid of foreigners. The Tung Wen Kuan, though connected with the tsung-li-yamen, was placed under the direction of Mr. Robert Hart, the inspector general of maritime customs. An English department was first established, with a class of about 10 students. The next year French and Russian departments were added, later a German department, and by 1899 a Japanese department also. During the four years following the establishment of the Tung Wen Kuan, the "new education" had made such progress that the tsung-li-yamen again presented a memorial to

¹ Lore of Cathay, p. 16.

the Throne in which occurred these words: "It is plain that it is impossible to do otherwise than to pursue the study of western knowledge." This memorial received the imperial sanction December 30, 1866, and the school was raised to the rank of a college. The membership, previously limited to 30, was now increased to 120. At first languages only had been taught, now a scientific department was added, and the chairs of chemistry, physics, mathematics, and astronomy were established. International law was taught by Dr. W. A. P. Martin, who in 1868 had been called to that professorship, and in 1869 was appointed the first president of the college—an office ably filled by him for 25 years. The progress made during that period was largely due to his scholastic attainments, his extensive translations, and his executive ability, influencing its entire life of nearly 40 years.

In the beginning students were selected only from the Manchus or from Chinese families who had been adopted by the conquerors of the Mings in 1644. Later on the doors of the college were opened to members of the Hanlin Academy, but these supreme scholars of China scorned to sit at the feet of the west, and being supported by the president of the academy, who was also the Emperor's teacher, they haughtily refused to become members of the college. Unable to secure students from the higher literati, they had to be content with recruits of lower degree.

In 1896 the full course of study extended over eight years. The first three were given exclusively to languages, and the remaining five were devoted to securing scientific and general knowledge through the medium of those foreign languages they had pursued. It was not usual for a student to attempt more than one foreign language. Classes of about 30 students were formed, who were expected to devote one-half of each day to Chinese and the remainder of the day to the language chosen and to scientific study. The college was in session for the entire year, with the exception of a short vacation at Chinese new year and during a few days in the warmest part of summer. Sundays were holidays for the foreign teachers only.

The college provided all its students with free tuition, food, and clothing, and in addition each received a monthly allowance from the Government; this amount was increased or decreased according to the student's proficiency in examinations. Written examinations were held at the end of each month, and examinations of three days' duration at the end of each year, the latter being always held in the presence of the ministers of foreign affairs. At each examination, monthly or yearly, prizes to the amount of from 40 to 60 taels were distributed as an encouragement to effort. Once in three years was held the "great examination" for determining the awarding of

official distinction. Receiving this distinction did not necessarily remove the student from the college. After performing his official duties at the yamen, which were usually but nominal, he was allowed to return to the college and continue his studies as a resident graduate; but he must hold himself in readiness to fill any official post to which he might be appointed.

In 1896 the faculty consisted of 4 native professors, 10 assistants, and 10 foreign instructors, including the president of the college. There were 120 students, averaging 30 years of age. Up to that time about 1,000 students had been enrolled in the college.

Some of the students secured positions in Government schools and arsenals; two became tutors in English to the Emperor Kuang Hsü; some became secretaries or interpreters to foreign embassies; others were appointed as consuls or vice consuls, while at least four represented their Government abroad.

There is no doubt but that Tung Wen College played an important part in helping forward the cause of modern education.

Soon after the establishment of the Tung Wen College the tsung-li-yamen established two auxiliary schools. One was located at Shanghai, having two departments, one in French and the other in English, enrolling about 30 students in each department. The other school, established in 1864, was located at Canton. By imperial edict it was to furnish instruction in English and Chinese to 20 Manchu and Banner boys. In 1870 this school sent 14 students to the Tung Wen College at Peking for further study. Of these, in 1880, 5 had retired, 3 had been appointed abroad, and 6 were still in the college. Up to 1880 no more students had been promoted from that school to the college; and these boys who had entered the school at 17 grew to manhood, married, and had families of their own, and were still pursuing their foreign studies.

In 1897 Russian and Japanese departments were opened, and in 1900 a French department was added. In 1904 there were 40 students in the Russian, 37 in the Japanese, and 42 in the French department.

This Tung Wen school was in 1903 amalgamated with another school under the name of I Hsueh Kuan.

The Foochow Arsenal naval schools, which had their beginning in 1867, were very prosperous under the management of Mr. Prosper Giquel, and have supplied China with some of her best naval officers. In 1880 the English school had about 50 students divided between the naval and the mechanical branches. The course of four and one-half years included the subjects of English, analytic geometry, algebra, trigonometry, navigation, and geography. The students received a monthly stipend of \$4.

The French school enrolled about 40 students in four divisions. The subjects taught were French, arithmetic, algebra, geometry, trigonometry, analytical geometry, calculus, and mechanical engineering. The students likewise received \$4 per month.

The Chinese Imperial Naval College at Nanking was established in 1890. During the first six years about 120 cadets had been enrolled, and in 1896 80 cadets were in attendance, averaging 19 years of age. Foreign instructors in navigation and engineering were employed, as well as several native assistants. The students were boarders and drew Government pay. English was taught and the college was doing good work, but after the war with Japan it received a new stimulus to progress.

At Wuchang was established in 1892 the Government mining and engineering college of the Hupei board of mines. Its 20 students received instruction from 1 foreigner assisted by an able corps of native teachers.

The Imperial Northern Government Telegraph College at Tientsin was established in 1879. Its superintendent up to recent date was Mr. C. H. O. Poulson. Native teachers were employed. In 1896 50 students were enrolled, varying in age from 16 to 22. They were divided into four classes and received a monthly pay of from 3 to 10 taels, according to their rank. Students entering with a good foundation in English and mathematics could complete the course of study in 4 or 5 years. During the first 16 years 300 students were sent out, having completed the entire course of study.

Not a few of the more intelligent Chinese had been gaining some knowledge of mathematics and science through the medium of works that had been translated by the early Catholic missionaries, and there were among them those who were thirsting for more knowledge and felt that the entire educational system needed reorganization. The subject was widely discussed and bitterly opposed, as is shown by the memorials establishing some of the above-named schools. These memorials sternly repudiated the notion that they were seeking to introduce new ideas borrowed from foreigners, as appears from the following citation: "The idea that it is wrong to abandon Chinese methods and follow in the steps of Europeans may also be dilated upon. It is to be remarked that the germ of western science is, in fact, originally borrowed from the heaven-sent element of Chinese knowledge. The eyes of western philosophers, having been turned toward the east, and the genius of their men being minutely painstaking and apt for diligent thought, they have succeeded in pursuing the study to new results. For these they have usurped the name of science brought from over the sea, but in reality their methods are Chinese methods. This is the case with astronomy and mathematics,

and it is equally so with the other sciences. China has originated the methods which Europeans have received as an inheritance."¹

As evidence that it has not been considered a disgrace for a scholar to receive manual training in the application of the theories of science they refer in the same documents to their sacred books. But they added the following apology: "The study now urged is the study of theory; that is to say, it is the scholar's duty to acquire knowledge through scientific analysis without compulsion upon men of letters and officers of government to take hold personally of mechanical pursuits. Can doubt further exist?" The new movement was making slow progress. The importance of wider dissemination of the new learning was making thinking men desirous of reforms. In 1869 the viceroy of Fookien memorialized that a knowledge of mathematics should be required for the Government civil-service examinations. The memorial failed to receive the royal sanction, and in 1875 the viceroy of Chihli, Li Hung Chang, made a second petition, adding physical sciences. This likewise failed to receive the sanction of the Government.

Meanwhile attempts were made to introduce mathematics into the provincial examinations, which doubtless showed that the new learning was acquiring favor more rapidly with the literati of the country than with the Peking authorities.

In 1874 an examiner of mathematics accompanied the commissioner of education to Hunan, but no candidates appeared. In 1885 a few candidates were examined in Shantung, but it was not until 1887 that the Government yielded, and by an imperial decree these subjects were added to those required at the metropolitan examination. The following year, at the triennial examination held in Peking, for the first time in Chinese history students of science were placed on a par with those of classical learning. Sixty candidates presented themselves, only 32 of whom were considered advanced enough to be admitted to the examination, and only 1 obtained the degree. A writer of the time remarks: "No one can possibly overestimate the importance of the effect upon the future history of China. This first and only man promoted to the second literary rank for his knowledge of science is the sure leader of a great host in days to come. The thin edge of the wedge has been driven into the competitive system, which in the end will rive asunder the old wall of Chinese conservatism, liberalizing the minds of the literati and setting them forward in the path of progress."²

It was after the Tientsin massacre (1870) that the Chinese Government, through Tseng Kuo Fan's representations, consented to Yung

¹ "The new education in China," by L. W. Pilcher. *The Chinese Recorder*, 1889, pp. 305-310.

² November number of the *Chinese Recorder*, pp. 89, 90.

Wing's plan to educate Chinese youth in the United States. It was during his undergraduate days at Yale (1850-1854) that he conceived the plan of organizing a Chinese educational commission. In August, 1871, by imperial edict, \$1,500,000 were appropriated to send 120 students to the United States for 15 years. Yung Wing and an assistant were appointed commissioners in charge of them for that period. Four yearly installments of 30 students each, the youngest to be not less than 12 and the oldest not more than 15 years of age. They were selected from respectable homes, required to pass a medical examination, also an examination in Chinese, and in English in case they had studied it. All candidates had to attend a preparatory school in Shanghai for at least one year before leaving for the United States. The parents were required to sign papers stating their willingness for their sons to go, and consenting to their remaining in the United States for 15 years, and that the Government was not to be held responsible for any accident that might happen to any of them. The Government was to pay all their expenses while absent, to give them a suitable outfit, and to provide Chinese teachers to instruct them in the Chinese classics while in the United States. The preparatory school for preparing these four installments was established at Shanghai under the supervision of Liu Kai Sing. Nine-tenths of the students came from the south of China. In the summer of 1872 the first installment reached the United States, and were distributed in families living near Springfield, Mass. Before this, in 1871, Tseng Kuo Fan died and Li Hung Chang succeeded him on the educational commission. In 1874 Viceroy Li recommended the building of a substantial headquarters for the Chinese educational commission in the United States, and the next year the new building was erected at Hartford and occupied.

In 1876 Yung Wing, contrary to the advice of some of his friends, accepted the appointment of associate minister to the United States, Peru, and Spain. His last act in connection with the educational commission was to make application to the United States Government to permit some of the Chinese students to enter the Government military and naval academies. He received the following reply: "There is no room provided for Chinese students."¹

For reasons, which it is not necessary to relate, the Chinese Government recalled these students in 1881. At that time the majority of them were either in scientific schools or in colleges, and all but two were undergraduates.

In 1882 Dr. Yung Wing returned to China to try to persuade the Government to permit the older students to return to the United States and complete their studies, but in vain.

¹ My Life in China and America, p. 207.

For some time after their return to China, the students received no official recognition. Subsequently "about 14 were sent to each of the naval academies at Foochow and Tientsin. Over 20 were appointed to the service of the imperial telegraph administration. Eight were placed in the viceroy's (Li Hung Chang) medical school at Tientsin, under the care of Dr. Mackenzie. About the same number were sent to Kaiping, and also to the torpedo service at Taku. Of the remaining 28, 6 went back to the United States, about 10 were left in Shanghai, and the rest scattered here and there."¹

The tsung-li-yamen, unwilling to establish a medical college in connection with the Tung Wen College, appointed Dr. Dudgeon, of the London mission, Peking, professor of anatomy and physiology in the college. It was left for the viceroy, Li Hung Chang, to open the first Government medical college in China. In November, 1893, the military medical college was established in Tientsin, too late to be of any practical help in the war that followed.

In 1887 Li Hung Chang, through a suggestion of Mr. Detring, commissioner of customs, formulated the idea of establishing a university in Tientsin. With funds contributed by both Chinese officials and Europeans a large building was constructed on the river bank below in the European settlement. Dr. Charles D. Tenney was called to the presidency, but for some reason Viceroy Li did not proceed further, and the building remained empty for eight years. It was not until 1895, after the war with Japan, and upon the promise of the customs taotai at Tientsin to finance the institution with funds from the telegraph administration, the China Merchants' Steamship Navigation Co., and the customs taotai's yamen, that imperial sanction was given for the organization of the Tientsin University. Dr. Tenney, who during these years of waiting had been conducting a private school at Tientsin, now entered upon his duties as president, and Mr. Tsai Shao Chi, formerly a Yale student, became the first Chinese director. The Government at that time having no secondary schools, a preparatory department with a four-years' course in English and elementary mathematics was organized in connection with the university to prepare students to enter the collegiate department. A four-years' course was arranged in the four schools of civil engineering, mechanical engineering, mining, and law. In order to organize classes without delay in these special departments, students who had made preparation in the private schools of Tientsin, Shanghai, and the British Government schools of Hongkong were entered in the lower classes. The first class graduated in the early spring of 1900.

With the Boxer outbreak the students were sent to their homes. Later came the seizure and occupation of the university buildings by

¹ Educational number, East of Asia Magazine, p. 112.

the German military forces, and the life of the first Tientsin university was thus ended.

The next important educational institution to be established was the Nan Yang College at Shanghai in 1897. The plan originated by Sheng Hsuan Huai was to found a college where students, having already received the elements of a Chinese education, could take a thorough course in English and western science, and at the same time prepare for the Government competitive examinations. An annual grant of 100,000 taels was subscribed by the Chinese Merchants' Steamship Navigation Co. and the Imperial Chinese Telegraph Co., each giving 50,000 taels. These pledges having been confirmed in a memorial to the Throne, an imperial decree was issued authorizing the establishment of the college. Dr. John C. Ferguson, president of the Nanking University, became the first president, and was authorized to purchase a site and erect the necessary buildings; these were completed in 1899. The institution had three departments, a primary, preparatory, and a commercial school, each with a three years' course of study. Mr. Lattimer, a former instructor in the college, has written: "No graduate of the commercial school would find much difficulty in gaining admission to the freshman class of an American college after a year's study in the United States."¹ Since the resignation of Dr. Ferguson in the autumn of 1901, the administration of the school has been entirely in the hands of the Chinese officials, though American teachers have formed a part of the teaching staff. In 1905 the college was made a school of technology and commerce and placed under the control of the ministry of commerce, and in April, 1907, it became an imperial polytechnic college under the administration of the ministry of posts and communication.

During this period Chang Chih Tung attempted to institute some reforms by introducing western education at Wuchang, the capital. Colleges of agriculture, language, mechanics, mining, and military science were organized. Professors were invited from America, Belgium, England, France, Germany, and Russia. Many of them were enthusiastic, expecting to organize modern colleges and teach according to modern methods. But the two Cornell University graduates who were called to conduct the agricultural college found that no provisions had been made for the college, and when, after long delays, the work was begun, it was hedged in on all sides by conservatism. The American instructors, though receiving good salaries, chafed under the restraints and, unwilling to fritter away their time, resigned.

The disastrous defeat in the China-Japanese war convinced China that she must make some reforms in education or never regain her

¹ The South China Collegian, July 1, 1905, p. 123.

place as the first power in the east. Many of her literati, scholars having the highest degrees, sought instruction in western learning by attending missionary schools and colleges, by employing private teachers, by forming clubs, and through the private reading of all the translations of western books available. Even the Emperor, Kuang Hsu, who for years had been studying English, now became so interested in western science and learning that he had his eunuchs searching out and bringing to him all the translations of books on western learning that could be found, among them being the Bible, portions of which he is known to have read. Never before had there been such a demand in China for the new education. By 1896 all schools where western science and language were taught were overcrowded with pupils. Even young and inexperienced students found it easy to obtain lucrative positions as private teachers. At this time many Peking officials, some quite advanced in age, matriculated in the preparatory department of the Peking University for the purpose of beginning the study of the English language. Special classes were formed to accommodate them. The older men, though famous for their Chinese learning, had passed the age when men can easily learn a foreign tongue. It was often not only amusing, but pathetic as well, to witness their vain efforts to speak the language distinctly. The great majority of these older men, finding the language so much more difficult to acquire than they had anticipated, after a few months of hard work, became discouraged and retired. Some persisted, and though never becoming fluent speakers, were able to make good Chinese translations from English. Excellent results were obtained by a number of the younger men, all of whom were Government graduates, some having the second degree ("chu jen," or master of arts), and two were Hanlins (LL. D.), members of the imperial academy. So anxious were these brilliant scholars to acquire a knowledge of western learning from an American teacher that they thought it no disgrace to sit side by side with boys their pigmies in classical learning; a marked contrast to the Hanlins, who, in the sixties, had refused to study foreign languages in the Tung Wen College.

There were, however, men of vision among the literati and officials. They saw that reforms alone could save their nation and they sought to bring them about. In a short time a Chinese reform club, having at first a membership of about 30, was organized in Peking. Its main object was the translation of newspapers and books into Chinese. The newspapers were circulated among the Chinese officials that they might become acquainted with western methods and conditions. The books were the best that could be found on science, literature, and law, and were to be at the disposal of any who might desire to read them. It being contrary to Chinese law for any company of Chinese

to meet to discuss Government matters, in less than a month after the establishment of the club the Emperor was memorialized on the subject, and he caused the place of meeting to be sealed; later on, receiving another memorial in favor of the club, he restored it, but made it a Government institution, nominating his teacher, Sun Chia Nai, president, and retaining the former board of managers. The Emperor and many of the officials promised to give liberally toward its support.

Reform clubs then sprang up all over China. Their membership consisted largely of the younger members of the literati; scholars who had been trained abroad or in the modern schools of China, and a few of the members had been in consular or diplomatic service abroad.

The "Cassini convention,"¹ the territorial advance of Germany, Russia, England, and France, the articles that filled the foreign newspapers and periodicals on the break-up of China, the partition of China among the European powers, and like questions of the day, aroused the Chinese as nothing had done before. They saw their helpless condition and realized that something must be done, and that soon.

It was known throughout the Empire that the Emperor had been devoting all the time he could get to the study of those works that would both qualify him to rule wisely his people and to make preparation to enter upon reforms that would place his country alongside the leading powers of the world. To show the influence of this study upon his people, we quote from Prof. Headland: "I doubt if any Chinese monarch has ever had a more far-reaching influence over the minds of the young men of the Empire than Kuang Hsu had from 1895 till 1898. * * * The fever for reading the same books that Kuang Hsu had read was so great as to tax to the utmost the presses of the port cities to supply the demand, and the leaders of some of the publication societies feared that a condition had arisen for which they were unprepared. Books written by such men as Drs. Allen, Mateer, Martin, Williams, and Legge were brought out in pirated photographic reproductions by the book shops of Shanghai and sold for one-tenth of the cost of the original work. Authors, to protect themselves, compelled the pirates to deliver over the stereotype plates they had made, on penalty of being brought before the officials in litigation if they refused. But during the three years the Emperor had been studying these foreign books, hundreds of thousands of these young scholars had been doing the same, preparing themselves for whatever emergency the studies of the young Emperor might bring about."²

¹ In 1896, through this treaty, Russia secured from China territorial and railway concessions in Manchuria.

² Court Life in China, pp. 132, 133.

CHAPTER II.

EDUCATION FROM 1898 TO 1900—REFORMS AND COUNTER REFORMS.

In 1898 Emperor Kuang Hsu entered upon the greatest revolution in the history of China, by issuing his famous edicts, which embodied the great principles of all the reforms that have since been instituted in China. Memorials were sent in by men holding the highest rank and influence, advocating these reforms, and while Kang Yu Wei is accredited with originating the most sweeping of the reforms, yet we must remember that there were men of the type of Sun Chia Nai and Chang Chih Tung who were in full sympathy with the Emperor. In China's Only Hope, Chang Chih Tung advocates many of the radical changes that the Emperor hoped to institute.

The Emperor, in replying to some of his old conservative ministers who were urging him to conform strictly to the ancient institutions and reject all suggestions of a new régime, says: "Let us ask what other country except our own is there that is laboring under such difficulties, because of being behind the times. * * * Our scholars are without solid and practical education; our artisans are without scientific instructors; when compared with other countries we soon see the glaring difference between our strength and the strength of others; and when we compare the ready wealth of this Empire with that of other countries, the difference is still greater to our detriment. * * * Changes must be made to accord with the necessities of the times."¹ That he had no intention of ruthlessly casting aside all doctrines of the past, he goes on to say: "Let us, keeping in mind the morals of our sages and wise men, make them the basis on which to build new and more advantageous foundations." Then, advocating the necessity of reform, he continues: "We must also select such subjects of western knowledge as shall keep us in touch with the times, and diligently study and practice them in order to place our country abreast with other countries. Let us cast off from us the empty, impractical, and deceiving things which obstruct our forward progress, and strive with one-heartedness and energy to improve upon all things that we have learned;

¹ This and the following quotations are taken from The Emperor Kuang Hsu's Reform Decrees, 1898. Reprinted from The North China Daily News.

let us eliminate the crust of neglect that has accumulated on our system, and cast away the shackles which bind us; in a word, let us evolve useful things out of those which hitherto have been useless, and let us seek able instructors to fashion the materials in our possession. With these objects in view, let us strive toward advancement and progress."

On the same day, June 11, he ordered the establishment of a great university in Peking that should be a model for the capitals of the Provinces to copy, and commanded his ministers and the princes to provide speedily for its inception. After stating that "all who desire will be given all the privileges and instruction the new University of Peking can provide," the edict closes with these final declarations: "We earnestly hope that all will eagerly take advantage of the modern education now open to them, so that in time we may have many able and willing helpers in the great and arduous work before us, of putting our country on a level with the best of the western powers. Let everyone listen to and obey these, our sincere and earnest words, and let it be known that this edict is specially issued to all our subjects." Two days later, June 13, Hsu Chih Ching, a recorder of the Hanlin Academy, recommended to the Emperor's favorable notice Kang Yu Wei, known as "Kang, the Modern Sage and Reformer," a third-class secretary of the ministry of works, as being a man "of deep learning and exceptional ability and progressive ideas." Dr. Arthur Smith says of him: "He had the welfare of China deeply at heart, and had studied its conditions and the possible methods of reform until he had clear and definite ideas of what could be done and of what ought to be done."

Kang had written two books, *The Reforms of Russia* and *The Reforms of Japan*, which he sent to the Emperor. These were followed later by a memorial urging the Emperor to be firm and not delay bringing about reforms. Mr. Kang's introduction to his Imperial Majesty was largely due to Wêng Tung He, the Emperor's tutor, who had been devoting considerable attention to Mr. Kang and had become deeply impressed with his ability. June 16, Kang was granted an imperial audience, which is reported to have lasted two hours, and to have so deeply impressed the Emperor with the needs and methods of reforms as to inspire him to issue his famous edicts of that summer. An edict was issued June 23 that abolished the "Eight-Legged Essay," called the "Wen Chang," which was the standard for Government examinations. "The Wen Chang is a style of composition of ancient and arbitrary origin which stretches the elastic thought upon a cruel rack. The eight legs upon which the essay stands are as rigid as if cut out of wood with a saw. The number of characters (words) and for the most part

their meaning and purport in each leg must agree with those in the corresponding leg. The least slip would be fatal to success. To make these numbers correspond required the unceasing, untiring, and indefatigable labor of years, and the strain of the continued agonizing effort during the three days of incarceration in the damp, cheerless cell is something awful.”¹ It was pointed out that in the time of Kang Hsi the Wen Chang had been abandoned and short essays substituted instead; that though this lasted but a short time, yet it made the reign celebrated for its number of learned and brilliant scholars who proved their worth in a practical manner; that they had the ability to search and compare ancient lore with that of their own times. It declared that learning had declined by scholars sticking to the classical style, that it had produced fraudulent practices in the system of examinations, that no man desired to be learned beyond the requirement for the degree for which he wished to be examined. “To this deplorable state have we now come. But to attain solid and practical education, adequate to the times we live in, we must cast away all empty and obsolete customs, nor can we advance true talent by following the old régime.” In the future all the examinations for the chu jen and chin shih are to be conducted according to the new requirements. “We have been compelled to issue this decree because our examinations have degenerated to the lowest point, and we see no other way to remedy matters than by changing entirely the old methods of examinations for a new course of competition. Still scholars must not forget to study the Confucian analects and the classics as the root of their education, from whence they are to write short practical essays suitable to the times we live in. Let us all try to reject empty and useless knowledge which has no practical value in the crisis we are passing through.”

In commenting upon this decree, Dr. Arthur Smith writes: “By a stroke of his pen the progressive and enlightened young Emperor revolutionized the stream of Chinese thought, long since semistagnant, and opened new channels. * * * There is a strong probability that if there had been no political counteraction the new scheme might have been put into operation without serious opposition and with far-reaching and beneficent effects, for there was already a large minority of thinking men throughout the Empire who profoundly felt the necessity of a change of some sort and would have gladly followed an imperial leader.

“It is true that not a few foreigners ignored or decried the reform movement as the mere effervescence of a handful of brainless enthusiasts, whose zeal outran their knowledge—dreamers, not practical

¹ The Educational Conquest of the Far East, p. 135.

men. But there are others whose occupation gave them ample opportunity of obtaining incontestable evidence, who affirm that it was a national and intellectual movement that permeated the Provinces and moved the mind of the nation. * * * A renaissance had begun.”¹

Immediately after the publication of this decree telegrams from the most distant Provinces of the Empire began to arrive at Peking University from students wishing to matriculate and secure accommodation in our university dormitories. Hanlin and chu jen came to have outlined courses of study for them to pursue at the university. Private schools of foreign science and literature were opened in Peking and other cities. Scholars came offering me large salaries if I would take charge of their schools, and when they found they could not secure my services, begged me to engage them instructors from abroad. Never can I forget those happy, enthusiastic students, their eyes sparkling as they told me of the Emperor's edicts and revealed to me their future plans of study. How hopeful they were for the future of their country! Surely “their ideas were changed, and their ideals were changing. This reform movement shook the Empire.”² In a month's time some of these students were in hiding to escape the vengeance of the Empress Dowager.

On the 26th of June a decree was issued reproving the ministers and princes for delaying to make reports of plans for the new university, and commanding “all concerned to hasten on with their consultations and report with all speed,” with “no more unmeaning delays in the matter.” Following this is a decree threatening punishment to all who in future delayed to carry out the imperial commands. A bureau of agriculture was established by imperial decree on July 4, and persons able to do so were commanded to translate western books on agriculture, which were to be used as textbooks in the agricultural schools and colleges soon to be established. On September 12 a decree provided for agricultural schools to be modeled after the Kiangyin school. July 6 a memorial of Hu Ping Chih, governor of Shansi, suggested changing the military examinations and allowing graduates of the newly established western-learning schools to compete for the chu jen and chin shih. The ministry of war and the tsung-li-yamen were commanded to deliberate and report on the same. The day following a decree virtually established patent and copyright laws for China, and rewards were to be given those writing practical and useful books and to those inventing articles of use, machinery and the like. The foreign office was commanded to draw up the necessary rules and regulations. On July 13, the yamen's report having been made and accepted, the scheme was put into operation. On July 11 appeared an edict concerning educa-

¹ China in Convulsions, vol. 1, pp. 136-137.

² Ibid., p. 138.

tion of the greatest importance, which looked toward the establishing of a national system of modern schools for the joint study of Chinese and western literature and science. Provisions were to be made for establishing schools and colleges in the provincial capitals, prefectural cities, departmental and district cities, all to lead up to the imperial university at Peking. All the rules and regulations for governing these institutions were to be furnished by imperial university authorities, and the rules and regulations were commanded to be observed.

All schools which had been established by public subscriptions, such as charity schools or local public schools, were to introduce western studies into their curriculum. The educational funds were to come from the telegraph administration, the China Merchants' Steamship Navigation Co., the Wei Sing Lottery at Canton, and perquisites of local and petty officials which had recently been turned over to the Government; also rewards were to be given persons making any public subscriptions toward the establishment or support of schools or colleges. Provision was made for translation bureaus for the translation of foreign books into Chinese, which were to be distributed among the schools for the use of the pupils. To save expenses, all temples belonging to the people not recorded by the ministry of rites were ordered turned into schools for the instruction and spread of western and Chinese learning. "By advocating reforms in this direction the minds of the masses will be enlightened by education, and whatever they may learn will be of the useful and practical kind, and thus our ambition to nourish talent and ability for the good of our Empire shall be accomplished. Let this edict be distributed far and wide for the information of all our subjects."

July 16 the Emperor accused his conservative ministers, delaying the carrying out of his decree, of ingratitude for the honors conferred upon them, and warned them that if in the future he found the same laziness in aiding him in his attempts at reforms they should bear the weight of his righteous indignation.

July 20 a decree proclaimed the regulations for the new examinations. Calligraphy was no longer to hold such importance in the examinations. "What we really aim at now is to give a practical education to our scholars, and hereafter successful candidates for literary degrees will not be selected for their fine penmanship, but for their practical knowledge of the subjects in which they shall be examined in future." The ministry of rites was given the permission to recommend to the Emperor any subject that they deemed necessary to be incorporated in the examinations. The Emperor, July 25, commanded copies of Chang Chih Tung's Essays on Exhortations to Study, to be distributed by the grand council to the various viceroys and governors with instructions to reproduce as many copies as

possible for dissemination among the students and scholars of the country.¹ The establishment of schools and colleges as feeders to the imperial university was ordered by a decree of July 29. August 4 five preparatory schools were ordered established in the city of Peking to prepare chu jen, chin shih, and Hanlin, living outside of the city, for their entrance examinations into the new university. On the 9th of the same month an outline of the scope of work to be done in the imperial university, with regulations and rules modeled after those of the Japanese and European universities, was presented by Sun Chia Nai, the director general of the university, and approved by the Throne. A site was selected and Dr. W. A. P. Martin was appointed president of the imperial university. "In recognition of his previous services," says the edict, "and to encourage him to further effort, we hereby grant him the brevet button of the second rank as a special honor. The board of civil appointments is commanded to take note of this."² Sun Chia Nai memorialized the Throne, urging the establishment of a Government newspaper, citing that it would be "similar to the ancient custom of officials calling upon the people for poems and literary essays in order to find out the thoughts filling the minds of the masses at the time under them." He goes on to suggest that "it will be most important to grant liberty and license to newspapers to write freely and succinctly on all topics whether advantageous or disastrous to the country, thereby giving warning notes and assisting those in power to know how to remedy matters and the like. These newspapers, moreover, could translate the news and editorials of foreign newspapers for the enlightenment and knowledge of officials and merchants, students and people, of what is going on in other countries. Such newspapers would then be more than valuable not only to local administration but also to enlighten all as to what is proper in regard to foreign intercourse." The memorialist further suggested that money be set aside for the support of this newspaper in the future. The memorial was approved, and the Chinese Progress, published at Shanghai, was made the Government official organ and money set aside for its future needs. Viceroys and governors were commanded to secure subscriptions from "all civil and military officers under their several jurisdictions, various bureaus, colleges and schools, in fact all who wished to subscribe to the Chinese Progress newspaper, and send said lists to the Government book-printing bureaus." Not only was liberty granted all newspapers, but they were commanded "to write broadly and plainly and in a liberal spirit on all subjects affecting the welfare of the Empire; * * * nor should they refrain from writing boldly against all frauds and misgovernment, thereby preventing us from

¹ China's Only Hope.

² This honor requires Dr. Martin to be addressed as "ta jen," or "your excellency."

learning the exact truth and facts. Kang Yu Wei was requested to codify regulations and rules for the guidance of editors of newspapers in accordance with those governing editors in foreign countries, which were to be "sent to Sun Chia Nai, who shall then present the same for our approval."

The following day the Emperor issued a long decree informing his people of his "heart's desires," urging them to comprehend his reforms and to give him their loyal support. Realizing that there were "traitors in the camp," he warns them: "Beware how you put on a false mask, pretending on your face to be eager to embrace the practical way but in your hearts determining to disobey our commands, and thereby thwarting our most earnest wishes. We can not forgive such hypocrites, who will only cause delay and embarrassment to our schemes for our country's welfare." He then points to Chen Pao Chen, governor of Hunan, as worthy of imitation. "Observe how earnestly he has worked for reform, see how by constant effort he has, as it were, hammered the advantages of practical modern reform into the minds of the gentry and literati of that Province and has brought them to join him in his efforts in that direction. You should all strive to follow that governor's practical earnestness and diligent energy." Young men of ability are needed to fill important posts, and the high ministers are commanded to search out and "recommend to us those who are really brilliant and practical in their talent and we will at once appoint such to posts where they may assist us in our great scheme of reform; but we shall not hesitate to punish those who recommend to us useless men. We see no other way to benefit the country unless we set earnestly to work in changing the present stagnant state of affairs, and you all must sympathize with our troubles and extreme difficulties in getting things done in the proper way."

On the same day commands were given Wang Wen Shao and Chang Yin Huan to look after the establishment of efficient schools for training men in the administration of railways and mines, also schools for the education of men competent to command the navy.

August 16 a Government translation bureau was authorized to be established at Shanghai, with Liang Chi Chao, M. A., ex-editor of the Chinese Progress Magazine, in charge, "for putting into Chinese western works on science, arts, literature, and textbooks for schools and colleges," especially for supplying the needs of the imperial university. Printing machines and American textbooks were to be purchased, and appropriations were made to meet the expense of the bureau.

August 19 a decree approved the joint memorial of the Viceroy Chang Chih Tung and Governor Chen Pao Chen, of Hunan, concerning the mode of procedure to be observed in Government ex-

aminations, and commanded the board of rites (li pu) to notify all provincial high authorities to make the necessary changes in the curriculum of studies in all the schools and colleges in accordance with the accepted regulations. The palace examinations for the Hanlin degree were for the time being abolished. The next day the ministry of war were commanded to make suggestions for reforms in the military examinations. August 21, as a result of suggestions made by Kang Yu Wei, embodied in a memorial sent to the Emperor, all viceroys and governors were commanded to establish in each of their respective Provinces a branch bureau of agriculture, arts, and commerce, and to report by telegraph the date of its establishment. On the same day it was ordered that "ministers and consuls abroad should establish schools for teaching Chinese literature to the sons of Chinese doing business in foreign countries, especially in the British Empire and Japan," and that the ministers to Great Britain and France should engage competent interpreters and put into Chinese the most important books on science of government, textbooks for schools, and the like, for the instruction of all officials in the Empire, and great care should be taken that they retain elegance and clearness in diction, and keep to the strict meaning of the originals. Such books were to be from time to time presented by the tsung-li-yamen to the Emperor for perusal.

August 26, through the memorial of the grand secretary, Sun Chia Nai, Liang Chi Chao, M. A., was granted permission to establish a training school for translators in Shanghai. On the same day the Emperor severely reprimanded the two viceroys, Liu Kun Yi and Tan Chung Lin, of the Liang Kiang (including Kiangsu, An Hui, and Kiang Si), and Liang Kuang (including Kuangsi and Kuang tung) Provinces, for delay in carrying out the reforms as commanded, and hereafter they, according to edict of the 27th of August, are to reply by telegrams. He urged Jung Lu, viceroy of Chihli, to be the first to institute reforms as an example to others.

September 8 a medical college, to be under the jurisdiction of the imperial university, was ordered established.

September 12 provision was made for the 2,000 former directors of studies in the prefectural and district cities, who had been thrown out of employment by the abolition of the Wen Chang and the establishment of modern schools throughout the Empire; these men were to be appointed tutors of Chinese classics in the new colleges and schools. On the same day imperial sanction was given for the establishment of a newspaper in Peking after the model of the Chinese Progress. In another edict, of the same day, the Emperor again explains the need of the reforms he is instituting. He would have his people know that his entire thought is for the good of the nation, that as western learning has brought happiness and prosperity

to other lands, so he would institute reforms, that his people might enjoy the same blessings. He would have them appreciate the danger of their situation. "The nations around us are gathering about us; they have come to take away what we can not keep; we are trying to prevent this; * * * we are fighting hard to conquer in order to bestow the highest blessings upon our beloved children." He commanded that all the reform edicts since June 11 should be printed and read by the officials to all the people, believing that when once the whole people understood the benefits accruing from these reforms that they themselves would work to carry them out. "Then will we have a strong China and a happy and contented people."

On September 19 provision was made for a compendium of the treaties to be printed for future distribution among all subordinate officers in the Provinces, so that they might study them thoroughly and so not display ignorance when called upon in regard to international matters. Provision was made for establishing middle schools in the capital to feed the imperial university. The students were all to be Government graduates selected by competitive examinations, and funds were provided for their support. Permission was also granted to establish a college of western learning in Peking "for the special education of sons of metropolitan officers from Sze Chuan and for such licentiates from Sze Chuan as may be staying in the capital." The college was to be supported by private funds already subscribed.

On September 21 occurred the coup d' état. The Emperor became a prisoner, never again to sit on the throne. The Empress Dowager seized the regency, which she held until the day of her death, and reactionary influences for a time gained full sway. Some of the reformers were executed, degraded, or banished, while others sought safety in flight or concealment. Of all the reforms of that summer the imperial university alone withstood the storm of reaction. It had a capital of 5,000,000 taels, but the president had scarcely had time to organize the institution, secure a competent faculty, and collect 200 or 300 students, before all were dispersed by the Boxer uprising. Later on all were relieved of their offices by the Chinese chancellor.

On September 21 the Chinese Progress and other official newspapers were suppressed, "because," as expressed by the edict, "they offer no advantages * * * and will only be instruments to stir up discontent and restlessness. * * * The Peking Imperial University is allowed to remain, but those schools intended to be established in prefectural, subprefectural, and district cities are commanded to be held in abeyance." The edict authorizing the use of temples, monasteries, and nunneries for school purposes "is hereby revoked and the present inmates allowed to remain there as usual."

On the 9th of October, by edict, the Empress restored the composition of Wen Chang at the literary examinations and returned "to the usual methods instituted by our ancestors," which were to be observed in future. "The system of special recommendation of men of learning and talent recently inaugurated is also prohibited from this day. * * * As newspapers serve only to excite the masses to subvert the present order of things, and the editors thereof are composed mainly of the dregs of the literati, no good can be served by the continuance of these dangerous instruments against the public peace. We hereby command our viceroys and governors of Provinces to suppress and confiscate all newspaper offices within their jurisdiction, to arrest the editors concerned, and to have them punished to the utmost extent of the laws. * * * The labors of the head bureau of agriculture, commerce, and the arts at Peking, having been so far abortive, there appears to be no necessity for its existence any further in the capital, and we, therefore, hereby abolish that institution."

October 11, feeling secure on the Dragon Throne, she began her edicts by using the first person singular, as "I, the Empress Dowager, hereby issue the following decree." On this date was issued a proscription against all reform clubs and similar associations, claiming their object was not to exhort men to be good and virtuous, but primarily to disturb the peace, and she commanded the viceroys and governors of the Provinces "to search diligently for members of these associations and punish them according to their respective responsibilities as chiefs or followers." The sentence against chiefs and principal members of secret societies (which the above were not) was immediate decapitation, while the less responsible were usually banished. Their property was to be confiscated to the Government. No leniency was to be shown, and "traitors will then learn to fear and tremble when they see their companions thus punished." At the same time Jung Lu was made the supreme head of all the military forces guarding Peking, and the power of life and death over them was conferred upon him by edict of the Empress Dowager.

November 1 she proclaimed her love for things medieval by restoring the old order of affairs in the military examinations. "I, the Empress Dowager, am of the opinion that, as the military examinations of students for degrees by the lifting of heavy stone weights, manipulations of the great sword, and archery on horseback and on foot, are merely a form to go through in order to obtain the three degrees—chin shih, licentiate, and chu jen—and have nothing to do with service in the army; this form should be still retained in military examinations, and I hereby command that viceroys and gov-

ernors and other officers follow the old order of things hitherto existing."

On the 13th of November the orthodox way of conducting the literary examinations was restored, as indicated by the following quotations from the edict: "I, the Empress Dowager, Tze Hsi Tuan Yu * * * to set at rest, once for all, the present uncertainty that has been caused by the Emperor's recent reform measures in the above direction,¹ now as the Empire has always prospered and flourished under the old régime * * * there is indeed no necessity for making any changes in the curriculum of literary examinations that has hitherto always obtained." The edict commands all literary examiners and literary chancellors and intendent graduates to "keep to the orthodox way." This retrograde policy culminated in the Boxer outbreak, which nearly wrecked the nation and made the Empress a fugitive. After her return to power she cast her lot with the progressives, she reenacted and enlarged upon many of Kuang Hsu's edicts, and started the country again on a great work of educational reform.

¹ Concerning the abolishing of the Wen Chang ("Eight-legged Composition").

CHAPTER III.

DEVELOPMENT OF MODERN EDUCATION FROM 1900 TO 1906.

A decree of June 5, 1901, granted the memorial of Sun Chia Nai, president of the Hanlin Academy, who complained that the members of the academy, instead of studying such subjects as would prepare them for appointments abroad and other Government offices, spent their time in trivial matters, such as composing poetry and other things which to-day are perfectly useless, and suggested that they devote themselves to the study of the principles of government, mathematics, chemistry, and other technical subjects; and also that each member should be allowed to select any such subject as he might desire, and furthermore that he be permitted, if he desired, to enter the Pei Yang Ta Hsueh Tang, Tientsin University,¹ or the Nan Yang College. The memorial being granted, Sun Chia Nai was ordered to draw up a list of subjects to be studied.

July 8 of that year the Empress Dowager issued a decree commanding all Chinese diplomatic ministers to keep a lookout for young Chinese, sons of merchants, who had shown special ability and talent while studying in schools and colleges in foreign countries and had graduated with honor, and possessed diplomas in their various professions. These young men were to be sent to China to undergo an official examination, and one of the three Chinese degrees is to be conferred upon each according to the extent of knowledge shown by the examination. Strictest impartiality in selecting these men was to be observed. The following month, August 29, she reissued the substance of Kuang Hsu's edict abolishing the wen chang in the examinations for literary degrees. She also abolished the old examination for military degrees, and September 11 commanded that military schools on a modern basis be established throughout the Empire, and as there are military schools in Tientsin, Nanking, Wuchang, and Chinan, the Viceroys Li Hung Chang, Liu Kun Yi, Chang Chih Tung, and Yuan Shih Kai were ordered to lose no time and draw up regulations for the new military schools.

September 14 she issued the great edict, which commanded all the provincial shu yuan or examination agencies in the capital cities to

¹ The Tientsin University was not reopened until April, 1903.

be turned into ta hsueh tang or universities modeled after the imperial university at Peking; in every fu and chou there was to be established chung hsueh tang, or middle schools, and in every hsien or district hsiao hsueh tang, or elementary schools, while many yang hsueh tang, or primary schools, were to be established in larger numbers. The course of study was to include the Chinese classics (four books and five classics), Chinese history and principles of government, and foreign science.

Three days later was published the edict regulating the sending of students to be educated abroad, "Commanding the viceroys and governors of other Provinces of the Empire to follow the example of Viceroys Liu Kun Yi of the Liang Kiang, Chang Chih Tung of the Hu Kuang, and Kuei Chum of Szo Chuan, in sending young men of scholastic promise and ability abroad to study any branch of western science or art best suited to their abilities and tastes, so that they may return in time to China and place the fruits of their knowledge at the service of the Empire. Upon the return of a student from abroad with his diploma, proving the completion of his studies, he may present himself before the viceroy or governor and literary chancellor of his native Province for examination, and, if approved of, may then be recommended to the ministry of foreign affairs for employment, and subsequently memorialized to the Throne for promotion by said ministry. The various expenses of the education abroad of said students shall be paid by the viceroys or governors of the young men's native Provinces, on account of the imperial exchequer. Any student desiring to go abroad to study at his own expense may obtain an official dispatch from his viceroy or governor introducing the said student to the Chinese minister accredited to the country where the said student wishes to obtain his education, requesting said minister to take charge of the young men and render any needful help required. These private students may, if they so desire, be treated on the same privileged terms as are to be accorded those who have been sent abroad at Government expense, and may also be granted literary degrees of chu jen (M. A.) or chin shih (Ph. D.), like the others, should they prove their knowledge of Chinese literature equal to the attainment of such high degree."

Yuan Shih Kai in 1901 secured the services of Dr. W. M. Hayes as president of the provincial college to be established at Chi Nan Fu, the capital of Shantung Province. Dr. Hayes drew up a system of rules and regulations for the college and the preparatory schools of the Province, which were to be under the control of the authorities of the college. His Excellency Yuan memorialized the Throne suggesting that a provincial college should be located at Chinanfu, a preparatory school for the university also should be located at the

capital, and as soon as possible other preparatory schools should be located in the fu and hsien cities. Annexed to the memorial was a copy of the rules and regulations. An edict of November 25 approved Yuan Shih Kai's scheme and ordered the cheng wu chu to make copies of Viceroy Juan's memorial and his regulations for colleges and schools and send to each viceroy, governor, and literary chancellor for their information, expecting them to model after the colleges and schools of Shantung. The cheng wu chu was also commanded to consult with the board of rites as to rewards and promotions to be bestowed upon successful students in the future. A report with regard to new methods of education and the bestowal of literary degrees upon graduates was soon made to the Throne, and on December 5 the following decree appeared: "Graduates of the lower schools, of promise and ability, are to be sent to the middle schools to complete a course of higher study; and graduates from the latter, selected for their talents and ability, are to be sent to the colleges of their native Provinces to go through another course of study. After these have graduated from their respective colleges they are to be styled "students of the superior class," and are then to be thoroughly examined by their own viceroys or governors and literary chancellors, and the most promising are to be granted passports to go to Peking for reexamination at the Peking University, after which they are to await an imperial decree bestowing upon them the literary degrees of chu jen, or M. A., and kung sheng, or senior licentiate. The latter are then to remain and again compete at the next examinations for the chu jen degree. Those who have obtained their chu jen degree are to again undergo another strict examination at the Peking University, and the most promising are to be sent by the said university authorities to the board of rites. The said board will memorialize the Throne, asking that some high ministers of the court be appointed to hold a special examination of these chu jen candidates, and a recommendation will then be presented to the Throne asking for the granting of the doctor's degree (chin shih) to the successful students. An examination of the latter will then be held in one of the throne halls, after which the successful candidates are to be introduced to the Throne, when either the grade of Hanlin bachelor or secretaries of the six boards or secretaries of the grand secretariat will be bestowed upon them." This edict again commands that Yuan Shih Kai's recommendation for schools and colleges is to be followed, first, in the provincial college at the capital; second, in middle schools; and, third, in lower schools.

January 10, 1902, a decree was issued commanding members of the Hanlin Academy to diligently study ancient and modern history and politics, also western learning, in order that they may be of future use to the Government. The chancellor of the academy is com-

manded to examine them every five months in their studies and report the results to the Throne.

On December 1, 1902, a decree states that though the "won chang" has been abolished, the examinations and the short essays on current topics used at the recent examinations for the chu jen degree does not qualify them for Government service; and it is decreed that not only the chu jen, but the Hanlin also, must hereafter attend the imperial university, and each person must pursue a certain course of study at the university shall obtain diplomas allowing them to enter the ranks of expectant officials in the Province. Those who have joined the public service shall be periodically examined in what they are supposed to know by the viceroys or governors. The chancellor of the university is commanded to draw up suggestions for a course of study to be pursued by the new graduates in question.

The Boxer troubles closed the schools in Peking and Tientsin, and in the north and west of China all the schools were temporarily abandoned for some months; some were completely destroyed. No doubt most of the schools outside of Shanghai were seriously affected. Soon after the Empress Dowager began to issue her edicts of reform; her viceroys and governors, owing their appointments to Her Majesty, were most willing to aid her in carrying out these measures. The orders were first to establish provincial colleges and so work down to the lower grades, a method that later, as we shall see, had to be reversed.

In 1901-2 new colleges were opened in the following Provinces with the accompanying appropriations for their annual support: Chekiang, 50,000 taels; Honan, 30,000 taels; Fookien \$50,000 Mexican; Kweichow, 20,000 taels; Shantung, 50,000 taels; Shansi, 50,000 taels; Kiangsi, \$60,000 Mexican; Kuangtung, 100,000 taels. Colleges were also opened in Soochow and Chihli.

A memorial signed by Chang Chih Tung, Chang Pai Hsi, and Jung Ching states that the sending of young inexperienced students to foreign countries has not been altogether a success, and recommends that older and more learned men be sent so that the Empire may receive more help from their experiences and study abroad. The memorial recommends that Hanlin and princes of high rank be permitted to travel abroad, and that they be rewarded by the Government according to the length of time spent abroad—first class, those that have spent at least three years in foreign countries; second class, those who have spent two years in Europe and America; third class, those who have traveled in Japan over one year. Those who stay in a foreign country less than a year are to receive no reward from the Government. The object of sending these men is that they may examine the methods of foreign governments, especially their

diplomatic policies; examine their military and naval regulations; and study into their educational systems. Men of the highest degrees are to meet foreign men of distinction and try to understand their customs and ideas. The men of lower rank are to take notes of what has especially interested them, and their notebooks upon return to China are to be handed to an imperial inspector and rewards to be given only to those who make out worthy notes. Those who remained in universities and pursued regular courses of study would accomplish greater results, and if upon their return they passed successful examinations they should be most liberally rewarded. Those standing first should be granted the Hanlin degree and given some important office; those who simply traveled were not to receive as high reward as those who studied while abroad; all officials traveling abroad would receive their regular salaries as an encouragement to such travel.

Chang Chih Tung recommended that an educational board should be established, located at Peking, to have control over the entire system of education in the Empire; that the imperial university should be under the management of one man, to be called "tsung chien tu" in order to make its management more effective.

August 21, 1903, Chang Chih Tung, Chang Pai Hsi, and Jung Ching made a report on the enforcement of the normal-school system and what should be the policy of the Government toward the chin shihs. It was recommended that the normal schools in Peking should be raised to the grade of a normal college, and that foreign languages were not to be taught in schools below the middle school. It had been planned in order that all Hanlins, chin shihs, and chung shus might understand some western learning that they study in a school called the "chin shih kuan." It was found not practicable to require all of them to enter the school, as some were disqualified on account of age. So it was agreed that all these scholars under 35 years of age should enter the chin shih kuan, and while studying to be paid salaries; but that those above the age of 35, who wished, were to be given the official rank of "chih hsien," district magistrate, and were then to be given offices in the Provinces; but should any of these older students wish to study in the "chin shih kuan" they might do so. This recommendation received the imperial sanction.

Although the Pa Ku Wen Chang (Eight-Legged Essay) had been abolished and the short essay instituted in its place, still the old competitive examinations were in existence. These examinations were the very bone and sinew of the Chinese constitution. China without her examinations was unthinkable; they possessed the key to official life; they required a thorough knowledge of Chinese literature, and what the literary chancellor had been obliged to know to secure his degree was still required of his undergraduates. To be

successful students they must still follow the old beaten tracks, and there was little or no time to give to modern learning. The goal of all Chinese education had been for over 1,200 years, and still was, Government official recognition. The modern educational system had been in force two years and few modern schools had been established. The people still clung to the old system, and as long as it was in existence it would be next to impossible to get the wealthy to give toward the establishment of modern schools, and without their voluntary contributions the schools could not exist. The leaders of reform saw that in order to develop the modern educational system the old examinations must be abolished. There were about 1,839 degree-giving halls in the Empire, with as many as 960,000 competing scholars, and there were at least another million of students preparing to enter the lists. It certainly would be a drastic measure, resulting in a great revolution, that would abolish the examination system and destroy the hopes of 2,000,000 men.

In the eleventh month of the twenty-ninth year of the reign of Kuang Hsü, Chang Chih Tung, Chang Pai Hsi, Jung Ching, and Yuan Shih Kai presented a memorial to the Throne advocating the gradual abolishment of the old examination system. They believed that unless it was fully known that the old system was to be abolished the modern schools would not prosper. They pointed out that if the modern system of schools, as had been outlined, were fostered and supervised by the viceroys and governors, in 10 years the colleges would be able to furnish numbers of young men capable of doing efficient service for the Empire. They offered the following suggestions in order to abolish the system:

1. For the degrees of Hanlin, chin shih, and chu jen, there would be held but three more examinations, the number of degrees granted to be decreased one-third at each examination, and so no more imperial or provincial examinations would be held after the third.

2. For the hsiu tsai (A. B. degree) there were to be held four examinations in the next six years. The number of degrees granted to be decreased one-fourth at each examination, abolishing the examination for A. B. after the fourth examination.

3. Thereafter the imperial examinations were to be restricted to graduates of the imperial university. The chu jen degree was to be conferred upon graduates of the provincial colleges, and the hsiu tsai to be given by examination only to graduates of the middle schools.

4. The educational officers of the old system were to be retained in the new educational system.

5. Men under 30 years of age having the degree of chu jen, or kung sheng, were to enter schools. Men from 30 to 50 years of age might enter the training classes in normal schools, and those who did not

wish to enter the normals might, after the three examinations, present themselves at a general examination (grace examination), where some of the highest might be made *chih hsien* and distributed among the different Provinces, and those of good literary ability, in case they are not made officials, might be given positions as teachers in the schools, and after three years' successful work might be rewarded by the Government.

It was an imperial decree of September 2, 1905, that gave the last blow to the old style of literary examinations. Yuan Shih Kai felt that the decree of gradually abolishing the old examinations would delay matters too much, and that the old examinations should be abolished at once in order to allow the expansion of the modern system of education, and so memorialized the Throne. Viceroy Yuan first pointed out that it would not be violating ancient custom, but rather following it, since "before the era of what is termed the Three Dynasties men of office were selected from the schools, and it must be confessed that the plan produced many talented men." The decree goes on to say: "It was indeed a most successful plan for the creation of a nursery for the disciplining of talent and the molding of character for our Empire of China. Indeed, the examples before us of the wealth and power of Japan and the countries of the west have their foundation in no other than their own schools. Just now we are passing through a crisis fraught with difficulties, and the country is most urgently in want of men of talent and abilities of the modern sort." He asserts that unless these old-style examinations be abolished at once the people of this Empire will continue to show apathy and hesitate to join the modern schools of learning. "Hence, if we desire to see the spread of modern education by the establishment of a number of schools we must first abolish the old style of studying for the examinations. The said memorialist's arguments on the subject show the result of experience and knowledge, and we therefore hereby command, beginning from the Ping Wu Cycle (1906), all competitive examinations for the literary degrees of *chu jen* (M. A.) and *chin shih* (Ph. D.) after the old style shall be henceforth abolished, while the annual competitions in the cities of the various Provinces for the *hsiu tsai* (B. A.) or licentiate degree are also abolished at once. Those possessing literary grades of the old style *chujen* and *hsiu tsai* who obtained their degrees prior to the issuance of this decree shall be given opportunities to take up official rank according to their respective grades and abilities." It states that the methods of rewards in rank and degree are to be the same as those formerly given in the examinations. "We are certain that the official classes and gentry throughout the Empire, on learning of this, will enthusiastically set about to start as many schools

as possible and to give the blessing of modern education to every individual subject of the Throne. * * * We command our ministers of education, on receiving this our imperial decree, to lose no time in at once distributing to the various Provinces the textbooks that have been prepared for schools, so that we may have a uniform system in teaching in all our schools." It further urges that primary schools shall be established at once in all the towns, hamlets, and villages, and that the utmost care be exercised in the selection of teachers for these schools.

The next day was issued an edict commanding that all the literary chancellors in the various Provinces should be given the duty of holding examinations and inspecting the schools of the Province to which each of them had been appointed under the previous régime, and that each should work in conjunction with the viceroy or governor of the Province in which he held office. The same day another edict commanded that for the sake of uniformity the literary chancellors of the Provinces, instead of remaining under the board of rites, were in future to be under the control of the chief commissioners of education (hsueh wu ta chen). The chief commissioners of education, Chang Pai Hsi, Jung Ching, and the Viceroy Chang Chih Tung, presented an elaborate outline for the educational system in China, and rules and regulations for the governing of the same. They had carefully studied the educational systems of foreign countries before preparing their report. The rapid development of Japan and her successes in the war with Russia called forth the admiration of China, and Viceroy Chang was especially pro-Japanese. Hence it is not strange that the Japanese educational system was to these commissioners the most attractive, and that they should have developed an educational system by grafting the Japanese system upon the old Chinese educational system devoted to the study of the Chinese classics. They were not trained in western learning, and it is not surprising that they did so poorly, but that they should have succeeded so well in outlining a complete system of education, which included kindergarten and orphan schools, lower and higher primary schools, middle schools, provincial colleges (higher schools), and a national university, with its colleges and graduate school. They also outlined courses for normal schools and colleges, colleges of languages, the Chin Shih College, agricultural schools and colleges, and technical schools and colleges. An edict of the eleventh month of Kuang Hsü, twenty-ninth year, approved this memorial.

On the 5th of September, 1905, an edict was issued in regard to Chinese students studying abroad. It states that the viceroys and governors have obeyed the command to send a number of selected students to study in foreign countries; that as there is a very large

number of students already in Japan, a large number should also be sent to study in Europe and America, and "to those who are willing to cross the wide oceans in order to gain substantial knowledge to be of use to their country when they return home we shall certainly show our deepest pleasure and commendations." The ministers abroad were to have charge of the students in the country where they were accredited, and they were commanded to "treat the students like their own children and relatives." They must also at times examine the students as to their studies and see that they lived orderly lives and were diligent in their work. "Should any of them be in want of money to prosecute their studies or any be ill, our ministers are expected to give what pecuniary or other aid the case may demand. * * * Let not our officials look slightly on these students, but assist the Throne in every way to obtain men of ability and use for the betterment of the Empire." The students were reminded that they should study with profit to themselves and their country, so that upon their return they might be of service to their Emperor. They were urged to make careful selections of studies, not choosing simple ones, nor shirking difficult ones, but choosing those subjects which they were best fitted to pursue and which would give them knowledge and ability so that they might upon their return show by examination that they were qualified to take places of responsibility.

It was after receiving a joint report from the ministers of the department of state affairs (*cheng wu chu*) and the commissioners of educational affairs (*hsueh wu ta chen*) that the Government created the ministry of education (*hsueh pu*), December 6, 1905. The following is a translation of a part of the edict:

"At the present moment schools and colleges are being established in every Province of our Empire, and it has therefore become necessary to create a department in the Government which shall be at their head for the better purpose of perfect control. We therefore hereby command that a ministry of education (*hsueh pu*) be created forthwith, and that Jung Ching, assistant grand secretary and chancellor of the Hanlin Academy, be appointed president of the new ministry. We further appoint Hsi Ying to be senior vice president, with the rank of an expectant metropolitan officer of the third grade. We further command that the duty and administration work of the imperial academy (*kuo tse chien*) be amalgamated with the new ministry. The newly appointed president of the ministry of education is also commanded to confer with his colleagues as to whatever shall be further needed for the completion of the rights and duties of the ministry that have not been touched upon in this decree and to report the same to us. With the inauguration of this new depart-

ment of the Government the members thereof have the very important and serious duty of specially seeing to the encouragement and nurture of education throughout the Empire, and we would therefore enjoin upon each and all of them to put forth their best effort to do their duty in furthering the earnest wishes of the Throne in this matter, which shall lead to the enlightenment and civilization of the people and the establishment of a universal education throughout the country."

The Chinese Government, realizing the necessity of coming into closer relations with foreign nations and of securing a better understanding of their various political institutions, manufactures, commerce, agriculture, navies, armies, and educational institutions, have since 1901 sent many delegations of commissioners abroad to study.

In 1904 Prince Pu Lun was appointed commissioner and Wang Kai Hah vice commissioner to go on a mission abroad to visit the St. Louis Exposition. Prince Pu Lun was the fifth prince of the imperial blood who had ever visited Shanghai during the past two centuries. The first was Prince Chun, the present regent, who in July, 1901, passed through Shanghai on his way to Germany to apologize for the murder of Baron Von Ketteler, German minister, in June, 1900. The second was Prince Tsai Chen, son and heir of Prince Ching, who in May, 1902, was on his way to England as special ambassador to congratulate King Edward on His Majesty's coronation. The third and fourth princes were the sons of Prince Su, who in the summer of 1902 were on a trip to the Straits Settlements and the Osaka Exhibition in company with the Mongol prince Kharachin. Again, in the fall of 1905, "the five high commissioners," composed of Duke Tsai Tse, Hsu Shih Chang, Tai Hung Tze, Tuan Fang, and Li Sheng Te, were commissioned to visit Japan, the United States, England, France, Germany, Austria-Hungary, Russia, Italy, and Belgium. China had for so long shut herself up in her complacency against the whole world that these commissions, composed of some of China's greatest men, should be sent abroad to study western education, agriculture, and jurisprudence, with the hope of finding something that would revolutionize and build up China into one of the world's great powers took the Occident by surprise. The results have more than justified the expenditure and truly demonstrated to the world that China is in earnest in her effort to reform her educational, industrial, economic, and constitutional systems. During the period of reorganization of education from June 1, 1901, to the time of the abolishing of the old system of examinations, September 2, 1905, as is indicated by the contents of the edict of that date, modern schools were not being established as rapidly as the Government desired. In some Provinces little if any attention had been given the subject, and in

some others where half-hearted attempts had been made the schools were of necessity poorly organized, the management was in the hands of unqualified men, and the teachers had little or no knowledge of pedagogy and western learning. There were three or four Provinces that had made a more earnest attempt. Chili Province at this time took the lead in educational matters. In a measure this was due to her location, being the metropolitan Province, although the schools of Peking are not under the jurisdiction of the Province, having an independent educational board, but the rapid development of the schools was very largely due to the energetic measures and good administration of the viceroy, Yuan Shih Kai. He had a clear conception of what was needed, understood how to organize, and was wise enough to employ Dr. Tenney to supervise the schools of the Province during the first period of reconstruction. In May, 1902, Viceroy Yuan established a provincial board of education at Paotingfu, with the object of having it supervise all the schools in the Province. Hu Yueh Fan was appointed tu pan (director). At the same time there were eight other officers connected with the board. The administration was divided into three departments, special science, general educational, and translation and publication. March, 1903, a printing press was added to the board's outfit, and a few months later the department of translation and publication added six more officers to its staff, superintendent of map drawing, proof reader, accountant, publisher, translator, and copyist.

By May, 1904, lecture halls were opened, where lectures were given under the supervision of the board of education. The lectures were given with the hope of educating the public along the lines of reform and progress in the new system of government, industry, and education. These halls are open every night, Sundays excepted, when four half-hour lectures are given by able men. By the end of 1905, 18 lecture halls had been opened in the Province. The provincial college at Paotingfu was organized in the spring of 1902. Its work was quite elementary, similar to that now required of the middle schools. In 1904 it had a teaching staff consisting of two Europeans and six Chinese, who were formerly students of the Tientsin University and the Tientsin Naval College. In 1902 a normal school was established at Paotingfu under Japanese instructors. Its object was to train teachers to take charge of the primary schools. In 1904 the school enrolled between 400 and 500 students, who were mostly of advanced age, many if not most of whom had Chinese degrees.

The Tientsin University (Pei Yang Ta Hsueh Tang) was reopened in April, 1903, having been rebuilt on the site of the ruined arsenal at Hsiku, situated about 5 miles outside of Tientsin city. The stu-

dents entering at that time were compelled to devote two years to preparatory work. In August, 1905, classes were formed in the technical departments of law, civil engineering, and mining. In 1906 members of the advanced class were sent to the United States to complete their education.

It was realized that middle schools must be established throughout the Provinces as feeders to the Tientsin University and provincial college. Dr. Tenney, president of the university, began their organization in some of the fu and chou cities, and by the spring of 1904 had 14 such schools organized, with an average of about 50 students in each school. These schools were scattered over the Province from the extreme north on the borders of Mongolia to the extreme south of the Province not far from the Yellow River. The Chinese examination halls (shu yuan) were reconstructed for these middle schools, and as a rule are very suitable and commodious. Former students of the Tientsin University were intrusted with the teaching in these schools, and were very successful, often showing much enthusiasm in the work. All the schools had athletic grounds, and the students were required to take physical exercise daily as a part of their work. We are told by Dr. Tenney that the gentry often looked askance at the innovation, but the fear of the viceroy compelled them to tolerate it. In 1904 orders were given to establish a middle school in each fu of the Province, and in each hsien was to be established a higher primary school, and the smaller places were to organize lower primary schools. At this date students were selected and sent to Japan for study in normal schools; upon their return they were expected to teach in the schools of Chihli Province. In order to save expense the three departments of the educational board were united in one department in October, 1904. In April, 1905, the board was moved from Paotingfu to Tientsin, where it is still located, having many buildings in spacious and beautiful grounds. That year the board was divided into seven departments, accounts, special sciences, general education, supervision, technical, map drawing, and one in charge of students studying in foreign countries.

At this time night schools were opened giving officials an opportunity to study English. The students sent the year before to study in the normal schools in Japan, having completed a short course, returned to Tientsin and were distributed among the fu cities to teach; and more students were sent abroad to study.

During this period other schools had been established in the Province. At Paotingfu an agricultural college was established in 1902, a medical college in 1904, a political science school in 1905. A military and a Japanese language school were also established. An industrial school and an army medical school were established in

Tientsin. The Educational Directory for China, 1905, gives the following report of the middle schools of Chihli Province under Dr. Tenney, superintendent:

Name of schools.	Chinese teachers.	Pupils.	Name of schools.	Chinese teachers.	Pupils.
Tientsin.....	6	90	Shen Chow.....	2	30
Chao Chou.....	3	50	Shen Te.....	4	60
Chengting.....	4	60	Ta Ming.....	4	50
Chi Chou.....	3	40	Ting Chou.....	2	30
Ho Chien.....	4	60	Tsun Hua.....	2	30
Hsuan Hua.....	4	50	Yung Ping.....	4	50
I Chou.....	2	30			
Je Ho.....	4	60	Total.....	52	750
Kuang Ping.....	4	60			

English is taught in all the middle schools.

By January, 1906, there were in Chihli Province 35 lecture halls, 8 technical and special schools, 21 normal schools, 24 middle schools, and 166 boys' higher primary schools.

CHAPTER IV.

CONTROLLING AGENCIES OF THE EDUCATIONAL SYSTEM.

The educational system in China, as we have seen by studying the growth of modern education, rests upon imperial decrees. The controlling authority, therefore, has been intrusted to, first, the ministry of education, with its headquarters at Peking, and, second, the provincial boards of education and other local officers. As shown in the previous chapter, the ministry of education (hsueh pu), created December 6, 1905, by imperial decree, has at its head a president and two vice presidents. These are assisted by five departments, three of which are subdivided into three bureaus, and the other two into two bureaus each. Each department has a senior secretary in charge, and each bureau a second-class secretary and one or two second-class assistant secretaries.

The first department is the department of general supervision (tsung wu szu), and is composed of the following bureaus: First, bureau of secret and important documents (chi yao ke), and, as its name indicates, it has charge of all secret and important documents, prepares memorials and documents for the ministry of education, has the supervision and recommendation of educational officials to be promoted or degraded. Second, bureau of records (an tu ke), which receives and files all records and reports from the educational boards of the Province. Third, bureau of textbooks (shen ting ke), which has the supervision, inspection, and approving of all textbooks, and the preparing and providing suitable ones for the schools of the Empire.

The second department is the department of professional education (chuan men szu), and is composed of: First, the bureau of instruction of professional education (chuan men chiao), which looks after the establishing of universities, provincial colleges, and professional schools of law, political science, and the like; it also has charge of the examination of private professional schools as to their standard, rank, and privileges, and makes reports concerning them to the ministry of education. Second, the bureau of administration of professional education (chuan men szu), which is to protect and encourage professional education; to examine all professional associations and to reward those who are worthy; to have charge of museums, observatories, and the weather bureau, and to have charge of all students studying in foreign countries.

The third department is the department of general education (pu tung szu), and is composed of: First, the bureau of normal education (shih fan chiao yu ke), which has charge of all normal schools; deaf, dumb, and blind schools, women's normal schools, and domestic education, as to their schedules, rules, regulations, administrative officers, teaching staff, and the like. Second, the bureau of secondary education (chung teng chiao yu ke), which has charge of middle schools for boys and girls, and all other schools of the same rank, as to their studies, rules, regulations, administration, teaching staff, and the like. Third, the bureau of primary education (hsiao hsueh chiao yu ke), which looks after the interests of all the primary schools, has charge of the halls for promoting education (chuan hsueh so); also of kindergartens and all elementary schools.

The fourth department is the department of technical education (shih yeh szu) composed of: First, the bureau of instruction in technical education (shih yeh chiao wu ke), which has charge of the agricultural, industrial, and commercial schools; also of all technical schools, as to their rules, regulations, administration, students, teaching staff, etc. Second, the bureau of administration of technical education (shih yeh shu wu ke), which is to examine into the conditions of technical education in the Provinces and to devise ways and means for promoting and supporting the same.

The fifth department is the department of finance (hui chi szu) and is composed of: First, the bureau for the receiving and disbursing of funds (tu chih ke), which has the preparing of the budget for the ministry of education and for the Provinces and also has charge of all the finances of the ministry of education and makes reports of the same; it also has charge of all property connected with the ministry of education. Second, the bureau of buildings (chien chu ke), which looks after the buildings of all schools, libraries, and museums of schools directly under the supervision of the minister of education; also examines the architectural plans for all schools in China. Third, the bureau of miscellaneous affairs (szu wu ting), which has charge of the seal of the ministry of education, and stamps all papers; superintends the buildings and grounds of the ministry of education, day and night, and is in charge of all the servants connected with the ministry of education.

The ministry of education sends out inspectors to visit the schools of the various Provinces, and they are required to make personal inspection of the schools and within six months to send in reports to the ministry of education of the number of schools visited with the number of teachers and pupils. The Peking Daily News of February 28, 1908, reports that these inspectors receive a salary of 200 taels per month, but it is not customary to publish the salaries of Chinese Government officers. The North China Herald of

December 18, 1909, page 642, states that "The regulations drawn up by the ministry of education for the inspection of schools have been approved by decree, and will be put into operation next year." The Universal Gazette, December 31, 1909, states that the ministry of education, having appointed educational commissioners and provincial boards of education, is contemplating establishing district boards of education in every Province.

The ministry of education is to establish a large depot in Peking from which it can supply every kind of educational requisite for the entire Empire. It has a nomenclature committee at work compiling a uniform and much-needed dictionary of technical terms.

About the time of the establishment of the ministry of education the Japanese ministry of education provided Japanese professors to give a five-weeks' course of lectures before the Chinese ministry of education and the commissioners of education who had been sent to Japan to study the Japanese system of education. Later in 1906 the commissioners of education who had not been abroad were requested to visit Japan and examine the educational system of that country before beginning their official duties.

In each Province there is a provincial board of education, called the *hsueh wu kung so*. All the officers of this board are nominated by the ministry of education and confirmed by the Throne. The provincial commissioner of education (*ti hsueh shih*) is to be of the same rank as the provincial treasurer, and is under the control of the viceroy or governor of the Province. His duties are, to enforce the regulations of the ministry of education; to report to the viceroy or governor any prefectural or district magistrate who is not carrying out the regulations of the ministry; to make yearly reports of all the schools in the Province and to present them to the viceroy or governor who will forward the reports to the ministry of education; to work with the provincial treasurer and see that funds are provided for the schools. He is also required to make reports whenever called upon, and he can, in cases of great importance, communicate directly with the ministry of education; but he can not leave the Province without first securing the consent of the ministry of education. This provincial commissioner of education, who has a number of officers to assist him, nominates, and the viceroy or governor appoints, six inspectors (*sheng shih hsueh*) who are chosen from normal graduates, returned students from abroad, administrators, or teachers of schools. These inspectors are required to visit the schools and make reports. There are a senior and five junior counselors called *i chang* and *i sheng*, who are to assist the provincial commissioner in devising ways and means for carrying out the educational program, and are to be able to answer all questions asked by the viceroy or governor concerning education in the Province. There are also a

superintendent of education (kao teng chiao yu Chiang shih), a private secretary (mi shu kuan), and a commissioner of investigation (chi cha).

There are six bureaus in the board of education, each having a president, vice president, and secretary. First, the bureau of accounts (huai chi ke); second, the bureau of technical schools (shih yeh ke); third, the bureau of administration (tsung wu ke); fourth, the bureau of general education (pu tung ke); fifth, the bureau of professional education (chuan men ke); sixth, the bureau of map drawing and engraving (tu shu ke). We have been informed that the educational board of Chili Province in 1908 contained 52 members; that 1 was a returned student having graduated in Japan; 1 a returned student, who had graduated from an American college; 5 had traveled in Japan; 14 were graduates of normal schools or of political science schools; 1 was a graduate of the Tientsin Naval College; 1 a graduate of an engineering school; 1 was a chin shih (Ph. D. Government graduate); 14 were chu jen (N. A. Government graduates); and all had received some Government literary degree. The expense of this educational board for the thirty-third year of Kuang Hsu (1907-08) was 41,264 taels, or \$29,760.

Educational commissioner's offices had been established in some of the foreign countries to have charge of Government Chinese students studying abroad. In Japan, where there is the largest number of Chinese students, this office is located inside of the Chinese legation at Tokyo. The Chinese minister is the president and the educational commissioner is his assistant, and must be chosen from among the Chinese legation secretaries in Japan by the ministry of education and the Chinese minister of the legation in Tokyo. The educational commissioner receives instructions from the minister, but all diplomatic affairs concerning the students are entirely in the hands of the minister, but the educational commissioner is to report such cases to the minister. It is the duty of the commissioner to keep records of the students as to their school work and character and to make reports of the same to the ministry of education in Peking. He also protects, directs, and corrects these students when occasions require, but is to act with discretion. He is also to give certificates, such as are required by the minister of education, to students graduating from Japanese schools; to issue excuses to students, such as granting them the privilege of returning to China on a visit or permanently; and he has the right to send back to China such students as have a bad character or are not making progress in their studies; but he must make reports also of these matters to the ministry of education. In making choice of a course of study, the student must first secure the approval of the educational commissioner before entering upon the work. The board-

ing or lodging places of students outside of the legation are subject to the commissioner's approval, and in case of sickness he selects the hospital to which the student is to be sent. He has charge of paying the monthly stipends to the students, and in cases where self-supporting students become financially embarrassed he may loan them to the amount of \$50, which must be paid back inside of two months' time, or the student will forfeit the right to borrow further sums from the office. Help can be given to but one student at a time from the same Province. In the case of the death of a self-supporting student the commissioner may furnish the amount necessary to send the body home, but the expense must not exceed \$300 Mexican.

The commissioner's office has four departments: First, charge of students; second, finances; third, charge of official documents; fourth, department of translation, where the regulations of Japanese schools are put into Chinese. The commissioner selects at the most 10 men for his staff of advisors, who are to aid him in solving difficult questions. The salaries of these lower officers are fixed by the minister. For the students studying in Great Britain and Europe there has been but one educational commissioner's office, which has been located in London, but we are informed that the ministry of education has changed this plan and in future educational commissioners' offices will be established in each European country where Chinese Government students are pursuing their studies. In the United States there is more than one educational commissioner. Dr. Tenney was one of the first to be appointed to look after the students sent out by the Tientsin University, and later they have been placed under a commissioner of the Chinese imperial customs. Mr. Yung Kwai, son of the venerable Yung Wing, is in charge of the Chinese students sent out under the indemnity fund returned to China by the United States.

The provincial board is also aided by supervisory boards of primary schools. In Chihli Province there were, in 1908, 31 such boards. In the same year there had been established in the Province 29 educational clubs (*chiao yu hui*). The ministry of education ordered all the Provinces to establish educational exhorting societies (*chuan hsueh so*), where the school officials and teachers might meet and discuss the ways and means for promoting the schools, and where some might receive help from those of experience and acknowledged success. In Peking, in 1908, an attempt was made especially to interest those connected with the Government, public, and private elementary schools to bring about better results and a more unified system of conducting the school and better teaching methods. They met at a place called the "Hu Feng Chiao" on the fourth Sunday in each month, in spring and winter, from 1 to 4 o'clock, and the

remainder of the year from 8 to 11 o'clock. Any teacher of Government, public, or private schools could become a member of this club through the recommendation of a regular member. In 1908 there were 149 of these societies in Chihli Province. Throughout the Empire there have been established great numbers of lecture halls (*hsuan Chiang so*). In Chihli Province alone there were by 1908 no less than 158 lecture halls. Four lectures are given every night, except on Sundays, from 7.15 to 9.15. During the daytime the majority of the halls are used for half-day schools. It has been my privilege to attend some of these meetings in Tientsin city. The halls are large and comfortable, fitted up with tables, stools, and long benches. They are well lighted, and the guests during the evenings are often refreshed by a cup of hot tea. The attendance is usually good, averaging anywhere from 80 to 160, and some evenings as many as 1,000 have been known to attend. In the city there were, in 1909, 18 lecturers, who volunteered their services, receiving but \$5 to pay for their rickshaw hire. Lectures are given to educate the people along educational, governmental, industrial, commercial, and general subjects. The provincial board of education insists that the edicts must be explained to the people; also that lectures shall be given on parliamentary government, so that the people may intelligently exercise the franchise as soon as a constitutional government is established in China. In many of the Provinces much pains was taken to prepare the people for the first provincial assemblies of 1909. One evening in the east ma lu lecture hall in Tientsin I heard lectures on the following subjects: First, How Egypt Came to Lose Her Independence; second, History of Korea; third, The Russian and Japanese War; fourth, Principles of Commerce. These subjects were discussed in an intelligent and instructive manner, and commanded the close attention of the hearers. Another evening the subjects were: First, The Cultivation of the Individual; second, Following the Customs and Manners That Have Been Handed Down to Us; third, Education; fourth, Books Which We Must Study. Every effort is being made by the educational boards to educate the people along the lines of modern education, and thus to secure their support and cooperation in advancing education.

CHAPTER V.

PRIMARY EDUCATION.

Under the head of primary education may be placed kindergarten and home education, elementary schools, and technical schools of an elementary character. The last class is treated under technical schools.

At the time of the adoption of the system of education no place outside of the kindergarten and home education was provided for the education of girls, hence this chapter otherwise treats only of schools for boys.

Kindergartens are to be established for children from 2 to 6 years of age, and are to be taught by women specially trained for the work. Thus far the ministry of education has not been able to give much attention to the developing of this work, but it does expect first of all to have kindergartens organized in connection with the orphanages that are being opened in the large cities, and it has provided that women shall be trained as nurses for the caring for and teaching of these orphan children. Training classes are to be provided for widows who may be able to devote themselves to the carrying on of this work. It is the plan of the Government to prepare books relating to home education, and also to have translations made of the best foreign books on kindergarten subjects. The Government hopes that through the preparation of these books many mothers will, by reading them, learn the most modern methods of training their children. It also suggests that the wealthy may be able to open such schools in their homes.

I was able one day to visit the first private kindergarten school established in Tientsin, which had been opened by His Excellency Yen Hsin, a Hanlin and the vice president of the ministry of education, in his home. It was carried on very successfully, doing the work of a model kindergarten, and its founder no doubt hoped by creating an interest in this department of education to induce many of the wealthier gentry to open kindergarten schools. His excellency had also established in his home a women's kindergarten training school, in which were 27 students; the instruction was good and the students gave promise of developing into good teachers.

In Japan the kindergartens have flourished and are looked upon by the people as a very essential part of the educational system, and

we may infer that they will be just as attractive to the Chinese people and in time will be established in large numbers in the Empire. The home life in China needs to be supplemented by just what the kindergartens can furnish. The Chinese child seems to be more amenable to early instruction and to kindergarten influences than the European child, and this should be taken advantage of, and a widespread use of the system would save much time and expense in after years when the child is passing through the primary schools.

The elementary schools are divided into two grades, called lower primary (*chu tong hsiao hsueh tang*) and the higher primary (*kao tong hsiao hsueh tang*). Sometimes the two are united in one school, known as a higher-lower primary. Again, there are schools called half-day schools, where the attendance is so great that accommodation can only be given all the pupils by dividing them into two classes, one attending school in the forenoon and the other in the afternoon. Again there are night schools, where the poor children who have to work during the daytime may attend and secure an elementary education. Many night schools have been opened in the towns and villages where men have attended in large numbers. The subjects taught are morals, reading, writing, and accounts.

Lower primary schools, having a course of five years, have been established for boys, who may enter at the age of 6. These schools are classed as Government, public and private schools. It is expected that each village having 100 roofs will establish one of these schools, and the Government expects this rule to be enforced by 1915. The Government proposes to establish in each *hsien* at least two so-called Government lower primary schools, and in each town at least one such school. The funds for these Government schools are to be supplied by the local magistrate. The public lower primary schools are such as have been established and organized according to the regulations of the ministry of education for lower primary schools, and are being supported by contributions that formerly were used for other purposes, such as theatricals. These contributions may be turned into a permanent endowment. Any private school supported by any individual, providing it has an enrollment of over 30 boys and conforms to the regulations made by the Government for lower primary schools, may be placed under Government control, being under the control and supervision of the local magistrate. All schools are to be established by sanction of the local magistrate, and without his sanction no school is allowed to be closed. The magistrate is expected to encourage and foster such schools, and if it be found that he is negligent in his duties, he is to be reported and degraded; and if he interferes and obstructs the establishment of schools, he is to be reported and severely punished. He is required to select some of the most respectable citizens to aid him in securing the establish-

ment of schools. His future promotion depends not a little upon how he has been able to organize, establish, and finance schools. Any citizen who gives liberally toward the support of these schools may be reported to the governor of the Province for reward.

The course of study extends through five years. Eight subjects are taught through the entire course, and the number of hours required per week is to be uniform through the course as given below.

Course of study for the lower primary schools (five years).

Subjects.	Number of hours.	Subjects.	Number of hours.
Ethics.....	2	Geography.....	1
Chinese classics.....	12	Science.....	1
Chinese literature.....	4	Drill.....	3
Mathematics.....	6		
History.....	1	Total.....	30

The work required in mathematics is: First year, 1 to 20; read and write; addition and subtraction. Second year, 20 to 100; multiplication and division. Third year, addition, subtraction, multiplication, and division. Fourth year, decimals; the use of the abacus. Fifth year, application of the four rules, using the abacus.

The work required in Chinese classics: First year, Filial Piety Classic; Analects, volume 1 (Lun Yu), taking about 40 characters in advance each day, reading and explaining them. Second year, Analects, volume 2 (Lun Yu); Great Learning (Ta Hsueh) and Doctrine of the Mean (Chung Yung), 60 characters per day. Third year, Meng Tze, 100 characters per day. Fourth year, Meng Tze, Li Chi, 100 characters per day. Fifth year, Li Chi, 100 characters per day.

The work required in Chinese literature: First year, nouns and verbs; second year, building sentences; third year, building paragraphs; fourth year, continuation of third-year work; fifth year, letter writing, common style. The pupils also have work in penmanship, and practice recognizing characters at sight.

History is one hour per week throughout the five years and consists of reading short stories and biographies of famous men in Chinese history.

In geography they begin with the neighborhood, extending out to the hsien, fu, Province, China, and the countries bordering on China.

Science work, elementary study in zoology, botany, and mineralogy.

Morals are taught to develop in the boys a desire to do right in and out of school.

Drill consists of physical exercises.

Drawing and manual work may be taken as elective studies.

The teacher has the right to diminish the number of hours of study during the 20 days before examination.

The old system of having the boys learn to commit without any explanations is no longer desired. The best schools explain the text as a pupil proceeds in his lesson. It is not unusual to find teachers still clinging to the old methods of teaching in the primary schools. In Tientsin city, while visiting schools, I found some old-style primary schools in the very vicinity where the "model primary school" is located. I had just left the model primary school and was therefore able to compare the old with the new system. The model primary school contained all the grades of the higher and lower primary schools. Here, indeed, I found all the classes conducted by able teachers, who not only understood the most modern primary methods of teaching, but were also able to apply these methods. Here I found the best primary work that I have seen in China. The pupils were in perfect order, giving the very best attention, were enthusiastic, and showed by their recitations that they had had excellent drill in the work they had been over. Never have I seen better work done in the schools of the United States than I saw in this model primary school. The work done in most of the modern primary schools that I have visited, while being somewhat better than the old schools, still falls very far short of what we would call good work in the United States. Most of the teachers are men taught in the old way and have very little knowledge of western science and less of pedagogy, and they find the old way much easier than the new. When China has young men teaching who have been well trained in normal methods, then, and not before, we may expect to find better primary schools in China.

It was discovered that the lower primary schools were not doing good work, and that the pupils were not able to complete all the outlined course of study in the five years, so, on May 15, 1909, the ministry of education sent in a memorial asking that the course of study for the lower primary schools might be altered to meet the needs of the people and with the hope of establishing a larger number of such schools. The ministry of education made the following suggestions, which were on the same day approved by an imperial edict: That each school should have at least 30 pupils, and that there should be offered two courses of study, one a complete course and the other a much easier course. The memorial says: "When we examined the lower primary schools last year, scarcely could be found one school conforming strictly to the regulations as outlined by the ministry of education. To be sure, most of the officials had a few schools to show off, but these were so few as not to be worthy of mention, but there were schools where the officials could show that a large

amount of money had been spent with very little work done. When asked the causes for the poor work that had been done, the following were some of the complaints offered: 'The course of study contained too many subjects; the funds for the school were not sufficient to employ well-qualified teachers; and the number of hours of study too limited.' We believe these complaints are true." In the old course there were eight subjects; in the new, history, geography, and natural science are not to be studied as subjects, but some knowledge of them to be obtained from the subject matter in their new readers. In their place music is added and drawing is made optional. In place of 30 recitation hours per week, as in the old course, the new is to have 36 hours. Sunday forenoon is to be used for reviewing the week's work, and the afternoon is for rest. In the easy course the pupils will study reading, Chinese literature, and mathematics. If a school is located in a city the students should have physical drill, but if in the country they may do without it, especially if they have no teacher to do the work. Drawing is made optional in this easy course. The people living in a place may decide which course shall be taught in the school, and if they wish both courses in the same school, two departments may be formed. In case a pupil who has completed a short course wishes to enter the higher primary, he must make up all the work required in the complete course before he enters. The number of years may also be cut down from five to three in the easy course.

The Chinese language has no phonetic system, but is made up of an unknown number of complicated idiographs, called characters. Each of these characters must be separately learned by the child through an effort of memory. He must recognize by the form of a character its name and meaning, and he also must know how to write the character from memory. All this places a heavy burden upon the child and prevents his making as rapid progress in his studies as could be made using a phonetic language. Wang Chao, the secretary who figured so conspicuously at the time of Kuang Hsu's reforms, has invented a phonetic system that has some good points, but as a whole is not generally considered satisfactory. The new era is looking for an inventor to bring this blessing to China.

After completing the lower primary course of study students may enter the higher primary. The course is limited to 4 years of 36 hours' recitations per week. These schools may be established in any city, town, or village. In every hsien there must be one so-called Government higher primary school. In any city or town, if there have been any self-supporting schools, they may be classed as higher primary schools by conforming to the rules of the ministry of education, and where these schools have been supported by contributions and collections, such as have been used for theatrical purposes, these collections may be regarded as endowments, and the schools

so established are known as public higher primary schools. Several villages may join together and establish a higher primary school after first securing the consent of the magistrate. When anyone establishes and pays all the expenses of a higher primary school, the school is classed as a private higher primary school, and must conform to the same rules as govern higher primary schools. The local magistrate is to see that higher primary schools are established and regulated according to law, and any violation on his part will subject him to censure and possibly to punishment. He may select respectable citizens to assist him in establishing these schools. The finances are left in the hands of the cities, towns, and villages to manage. The pupils are not required to pay tuition in the lower, but in the higher primary schools a moderate fee is required. The nine subjects taught during the four years embrace the following: Morals, 2 hours; Chinese literature, 8 hours; Chinese classics, 12 hours; mathematics, 3 hours; science, 2 hours; Chinese history, 2 hours; geography, 2 hours; drawing, 2 hours; and physical drill, 2 hours. As was the case in the lower primary, so we find in the higher primary that the Chinese classics occupied the most important place, as 6 out of the 12 hours given are devoted to the reading of the *Shih Ching*, or Book of Poetry; the *Shu Ching*, or Book of History; the *I Ching*, or Book of Changes; and the Section on "Mourning," in the *Li Chi*, or Book of Rites. The remaining 6 hours are devoted to the explanation of the texts, and the 96,856 characters in the texts read.¹

The work in Chinese literature is devoted to the study of the *ku won*, or ancient literature, and the translation of it into mandarin, the official language; the writing of essays and the study of mandarin. In mathematics the larger portion of a grammar-school arithmetic is completed and drill is given in the use of the abacus. The work in Chinese history begins with the ancient period and attention is paid only to the most important events and changes made in the life of the nation. The work in geography includes the study of China and foreign nations. In science the first, second, and fourth years are devoted to the study of biology, and the third year to elementary chemistry. The object in teaching morals is to develop character, and this is done by bringing out prominently the characteristics of great men and their sayings or teachings. Use is made first of the four books, and then selections are made from the Book of Poetry. The work in physical drill is not alone for the exercising of the body, but also to teach the student prompt obedience. The principal may permit the students to take manual training, agriculture, or commerce, in place of work in biology, and two hours' work may also be dropped from other subjects, and if the three subjects, manual training, agri-

¹ The Book of Poetry has 40,848 words in the text; the Book of History, 27,134 words; the Book of Changes, 24,437 words; and the Section on Mourning, 4,437 words.

culture, and commerce, are desired, the scheduled number of hours may be increased by two. There should be eight classes and no more in the school, so that students may enter at either of the two terms of the year. No class is to have more than 60 pupils. Qualified pupils up to the age of 15 may enter the beginning classes in the school. The principal may diminish the number of hours of recitation 20 days before the close of each term. When the pupils are examined the principal should invite the local magistrate to be present and help look over the papers and grant the certificates. At the end of the second term of each year every pupil who has completed all the subjects required in the course is to receive a certificate showing that he is a graduate of that school, and this certificate will be his passport into the middle schools. The rules forbid using corporal punishment on a boy above the age of 13, and when administered should not be too harsh. This rule had no place in the schools of the old régime, where a stupid pupil was often severely flogged to aid his memory or to pacify the anger of the master. Punishments of a milder form may be administered. The teachers are not to insist upon pupils repeating their lessons word by word, as was the case in the old schools, and which the old-fashioned teacher still likes even in the modern schools; in fact, they fall back into that rut unless constantly watched by the principal of the school. More attention is being given to the explanation of all subjects read. The excellent new Chinese readers that have lately been prepared for the primary schools by western-trained Chinese men, and that are now widely used in the schools, are doing the most to overcome the faulty methods of the past; but even in the teaching of these books the old Government degree man needs to be watched or he will lapse into the old method and the pupils will be repeating word by word without comprehending the text read. The schools are now required to use textbooks authorized by the ministry of education.

The regulations for schools recommend that the principal of primary schools should be a normal graduate, but knowing that there is not a sufficient number of such graduates to man the schools, permit anyone reputed to be a good manager to be employed temporarily as principal. The principal and his teachers are not allowed to leave their posts, nor to have any other occupation outside of the school, except by permission of the local magistrate.

Reports of the primary schools are to be made at the end of the second term, stating the number of teachers, assistants, students, and graduates, and given the local magistrate who will forward the same to the viceroy or governor of the Province, and he in turn will forward them to the ministry of education.

Public buildings, private temples, and nunneries may be taken for the use of primary schools. These buildings may be repaired or changed to meet the needs of the schools. Large numbers of these buildings have been turned into schoolhouses, and, in some cases, the rents of the temple lands have been used to support the schools. The school buildings are to consist of one story and must contain recitation rooms, session rooms, and a large public room where all the pupils may assemble for public services. Dormitories are not at first to be required, but later on they may be built to accommodate boys from country villages some distance from the school. All schools are to provide drill grounds, and the compound is to be sufficiently large to accommodate all buildings without crowding. The primary schools in some Provinces have not been established as rapidly as the Government had hoped. This has been due to various causes, but largely to the lack of funds. For the same reason many public and private schools have been closed, and again many of the schools have suffered for want of qualified teachers, especially for those who could teach the modern sciences. We must remember that the time since beginning the establishment of these schools has not been long—only about five or six years—and the normal schools have not yet had time to prepare anything like an adequate number of teachers for the millions of children that should be in the primary schools. But that so much should have been done in such places as Chihli Province holds out great hope that the time will come to China when as large a per cent of her children will be attending the primary schools as now attend the Japanese schools. In the year 1907-8 there were in Chihli Province 8,675 lower primary schools having an attendance of 148,399; graduates for the year numbered 537; the number of teachers, 8,969, with an average of 16+ pupils per teacher. The cost per pupil during the year was 2.63 taels, or \$1.88. The amount received during the year for the schools was 381,998 taels, or \$272,855.71.¹

The following report gives (1) the attendance in the lower primary schools in Chihli Province from 1902-3 to 1907-8, and (2) the ratio or per cent of attendance to the number of children of school age.

Year.	Attend- ance.	Per cent of attendance to children of school age.	Year.	Attend- ance.	Per cent of attendance to children of school age.
1902-3.....	1,000	0.0173	1905-6.....	68,000	1.1826
1903-4.....	6,000	.1043	1906-7.....	109,467	1.9037
1904-5.....	36,344	.632	1907-8.....	148,399	2.5808

¹ Allowing exchange of 1.40 taels for \$1.

In the same year there were in the Province 121 half-day schools; number of pupils, 2,971; graduates, 133; number of teachers, 133; number of pupils per teacher, 22.3; cost per pupil for the year, 0.178 taels, or \$0.127. Amount received from the half-day schools during the year, 514 taels, or \$367.14. The half-day public schools were supported by (1) rent from temple lands, (2) subscriptions, and (3) taxes on wine, tobacco and cigarettes, and taxation on estates. The highest number of teachers in any of the half-day schools was 12, and 400 pupils the largest attendance. The lowest number of pupils in any school was 5.

For the higher primary schools of that year we find the following: Total number of schools, 220; total number of students, 10,599; number of graduates, 521; average number of pupils per teacher, 20.4; cost per pupil for the year, 39.53 taels, or about \$28.23. The amount of funds raised that year for higher primary schools was 419,048 taels, or \$299,320. The largest attendance in any one school was 244, and the largest number to graduate from any school was 54. Graduates of higher primary schools are recommended for admission to the normal schools and middle technical schools, as well as to the middle schools. The following rewards are given the students at the time of graduation: To the first grade is granted "ling sheng," to the second grade "tseng sheng," to the third grade "fu sheng." To the fourth and fifth grades there are no rewards.

CHAPTER VI.

MIDDLE SCHOOLS, PROVINCIAL COLLEGES, AND UNIVERSITIES.

MIDDLE SCHOOLS.

The Government proposes to have a middle school (*chung hsueh tang*) established in each *fu*, but if any *chou* or *hsien* can provide for such a school and desires to do so, it is allowable; but in the beginning it was thought wiser to establish these schools only in the *fu* cities. According to the Chihli provincial regulations for middle schools, as published in the *Hsueh Pu Kuan Pao*, Volume XLI, Department IV, page 441, on December 1, 1907, there must be at least one Government middle school established in each *chou* of the Province, and more than one where the population is large enough to warrant doing so. We do not understand that this rule is binding on other Provinces. Each *fu* is responsible for the financing of its own school. When the finances of any middle school are managed by the magistrate and some of the wealthier citizens of that *fu* and conforms to the regulations of the middle schools, it is classed as a public middle school. Any school established and supported by individuals or by a corporation conforming to all the regulations of the middle schools is entitled to the same recognition, privileges, and protection as are given to the Government schools and will be known as a private middle school. Public buildings, nunneries, and temples may be rented for the use of these private schools. Not only are graduates of the higher primary schools entitled to enter these middle schools, but also all others who are able to pass by examinations the requirements for admission. The students are expected to pay tuition, but that is left for the provincials to settle. At the time of the opening of the middle schools there were few pupils qualified to enter, and so provision was made to admit, for the first five years, boys between the ages of 15 and 18 who had a good knowledge of Chinese classics and some knowledge of science. The *Peking Daily News* of May 31, 1908, states that the ministry of education has notified the commissioners of education in the Provinces that hereafter only graduates of the higher primary schools are to be admitted into the middle schools. Reports are required of the middle schools the same as of the primary schools. The course of study as first outlined extended through five years of 36 hours' recitations per week. The

following subjects were required: Morals, 1 hour through the course; drawing, 1 hour; physical drill, 2 hours; Chinese classics, 9 hours; mathematics—algebra, geometry, and plane trigonometry—4 hours; Chinese and foreign history, 2 hours; a foreign language, the first three years 8 hours, and the last two years 6 hours; Chinese literature, the first two years 4 hours, the third year 5 hours, and the last two years 3 hours; geography, the first two years 3 hours, the third and fourth years 2 hours; natural science, the first and second years, botany and zoology, 2 hours; the third and fourth years, physiology and mineralogy, 2 hours; the fifth year, geology, 2 hours; physical science, the fourth year, physics, 4 hours; and the fifth year, chemistry, 4 hours; political science and political economy, the fifth year, 3 hours.

It was soon discovered that the course of study was too difficult and needed to be modified. The ministry in a memorial acknowledged that only three or four students in a school were able to complete the work well in five years; that they had observed that there were too many subjects for the average student to get well, and recommended that the work in the middle schools should follow more closely the methods of the German schools; and that both a technical course and a literary course should be offered in the middle schools. The memorial was granted April 20, 1909. The students entering the middle school may choose either course. In the technical department the major requirements are a foreign language, mathematics, physics, chemistry, and biology; the minor subjects are Chinese classics and literature, history, geography, drawing, political science, and political economy. In the literary department the student must take for his major work Chinese classics and literature; a foreign language, which may be English, German, French, Russian, or Japanese, but English and Japanese are recommended by the ministry of education as the more important languages, and Chihli Province requires English; history, which includes Chinese, Asiatic, European, and American; and geography. His minor subjects are mathematics, science, political science and political economy, drawing, and physical drill. All textbooks before being used in the schools must have the approval of the ministry of education. The schools are to be supplied with suitable laboratories, especially for the teaching of physics and chemistry. Charts of all kinds are to be supplied for the work in botany, zoology, physiology, and also good maps for teaching geography. Each school is expected to be able to accommodate from 300 to 400 pupils, and if the funds of the school will permit there should be accommodation for 600. Every school should seek to have no less than 30 pupils in each of the five classes, but in the beginning of many schools classes had to be formed with fewer pupils. In Chihli Province the rules permit the authorities to admit pupils from adjacent chous in order

to make up the number required in each class, but on no condition to accept unqualified pupils. A student from one middle school may be admitted into another, provided he presents the proper certificate; but should a pupil secretly change from one school to another he is subject to expulsion. Dormitories and dining rooms, also reading rooms, are to be provided for the students in the compound. The principal and some of the teachers are expected to live in the compound, where they may have personal supervision of the students. The pupils can not leave the school premises except at stated times or by special permission. An athletic ground is provided for the pupils where they have military drill and various athletic sports. The teaching staff is composed of the principal, who has supervision of the school and complete control of his subordinates, teachers and assistant teachers, librarian, secretary, a proctor who looks after the general affairs of the school, and two proctors who have charge of the pupils' dormitories. The instructors of the middle schools are to be graduates of the Chinese normal colleges, who have obtained high rank in their classes, or graduates of normal colleges in foreign countries. The pupils pay tuition and board according to regulations, and should any change be found necessary in regard to the charges it must be reported to the educational commissioner and local magistrate. Pupils in Chihli are expected to furnish their clothing, uniforms, and stationery. The pupils are required to take the following examinations: (1) Monthly; (2) term examinations; (3) year examinations; (4) graduate examinations; (5) entrance examinations for provincial colleges. The examination for promotion to the middle schools is held in the presence of the commissioner of education, and for promotion from the middle schools to the provincial college is held in the presence of the viceroy or governor and the commissioner of education. Any two of the three following parties may constitute an examining committee: (1) The district magistrate; (2) the board of education; (3) the educational club. After each of the examinations the standings must be published. This is usually done by posting all the names of the students, with their standings, on the outside of the compound wall, near the main entrance to the school. The student whose name comes last, indicating that he is the poorest of his class, is said to "sit in the red chair." The magistrate fixes the dates of the examinations, and after each yearly or graduating examination the officer in charge of the school sends to the educational commissioner all the examination papers and books recording all the standings. The awarding of certificates belongs to the officer in charge of the school, but the conferring of rewards belongs to the educational commissioner, who in turn makes his report to the viceroy or governor of the Province. The following are the rewards granted to the graduates of the five-year course of the middle

schools: To the first-grade students is given the "pa kung," to the second grade "you kung," to the third grade "sui kung." These three grades are recommended for admission to the provincial, normal, and technical colleges. To the fourth-grade student is granted the "ling sheng," and those below are given no reward.

Up to 1909 there seems to have been many middle schools where little attention was paid to the requirements, and their students were permitted to graduate in four years or, in many cases, in even less. So great was this evil that an edict was issued January 19, 1909, forbidding these violations and declaring that thereafter only graduates of the five-year course should receive rewards.

In February, 1909, I visited the Paotingfu middle school, which is recognized as one of the best of the Government middle schools. I found the buildings poor and cheap looking, especially the two main buildings, which were two-story buildings with bedrooms below and four session rooms above. The furniture was poor and cheap, the blackboards were small and provided only for the teacher's use. The bedrooms would each accommodate about 40 students, each boy having a small stall separated from his neighbors by thin board partitions. In front of each narrow stall was a table, at which the students could write and study. The floors were paved with bricks, making the room damp and insanitary. I judge this plan for the dormitories for the middle schools is not uncommon, as I had previously found similar ones in some of the Tientsin Government schools, but these had been fitted up out of temple buildings, while at Paotingfu the buildings had been newly built. There were about 200 students in the school. The laboratories were poor and had but little apparatus. The teaching that I saw was not of as high grade as I had hoped to see. As a whole, the school was a disappointment to me. Only a few days before I had visited some of the leading schools in Tientsin and had seen the excellent work that was being done in the private middle school of which Mr. Chang Pai Lin was principal. Mr. Chang is an exceptional man, and is recognized as one of the ablest educators in north China. The school buildings were new and the best planned of any middle school that I have seen in China. Many of the teachers were Mr. Chang's former pupils, who had imbibed their master's enthusiasm and were, in the absence of the principal—Mr. Chang at that time was abroad, having been sent by the Government on a commission—carrying on the school in an able manner. To be sure they labored under many disadvantages, trying to follow the prescribed course of 36 recitation periods per week, which left but little time outside of the class hours for preparation. This was not the fault of the teachers, but of the system which they were compelled to follow. The teacher of the Chinese classics is still the old Government graduate who teaches in the old orthodox way, explain-

ing every bit of the text himself according to the accepted commentaries. The pupil is not expected to do any reasoning and little thinking. All that is essential on his part, according to Dr. Arthur Smith, is that "he should have a memory like that of a phonograph." Perhaps the framers of the modern educational system in China expected that much of the teaching of modern science would be taught in this manner. If not, why have they imposed so many recitations upon the modern school boy? Surely not until a more rational course of study is outlined for the Chinese student can we expect to find excellent results in the schools of the middle Kingdom.

By January, 1908, there were 32 middle schools in Chihli Province, enrolling 2,125 pupils, and 101 pupils had been graduated. There were 157 teachers in these schools, with an average of 13.5 pupils per teacher. The amount received for the schools from all sources was 207,097 taels, or \$149,355. The examination for promotion to the middle schools is held in the presence of the commissioner of education. The examination of students of the middle schools for promotion to the provincial college is held in the presence of the viceroy or governor and the president of the board of education.

PROVINCIAL COLLEGES.

In each provincial capital there has been established a higher school (*kao teng hsueh tang*), more commonly called the provincial college. During the first five years after these colleges were established they could receive students who had a thorough knowledge of the Chinese classics and had had one year's preparation in history, geography, mathematics, science, drawing, Japanese language, and English. In the beginning most of the work was necessarily preparatory for the college, and even in 1909 there was a middle school connected with the provincial college at Paotingfu. To-day only graduates of middle schools are received in these colleges. The curriculum requires three years of 36 hours per week. The graduates are prepared to enter the colleges of the imperial university at Peking. The national system of education permits the establishing of but one such college in a Province, and requires that accommodation should be made for at least 500 students, but any college may open with 200 students. Each Province must attend to the finances of its own college. At the end of the second semester of each year reports of the college must be sent to the provincial board of education, who in turn makes reports to the ministry of education. The curriculum provides for three courses of study: Course A prepares students to enter the imperial university colleges of Chinese classics, political science and law, literature, and commerce. Course B prepares for the colleges of science, agriculture, and engineering. Course C prepares for the college of medicine.

COURSE A.

Subject.	Number of hours.		
	First year.	Second year.	Third year.
Ethics.....	1	1	1
Chinese classics.....	2	2	2
Chinese literature.....	5	4	4
Foreign languages:			
English.....	9	9	8
German or French.....	9	9	8
History.....	3	3	3
Geography.....	3	2	
Oratory.....		2	
Law.....			2
Political economy.....			2
Military science.....	1	1	3
Military drill and gymnastics.....	3	3	3
Total.....	36	36	36

In place of oratory in the second year a student may elect mathematics or physics. Students wishing to study law may elect 2 hours of Latin in the third year. Those who wish to specialize in Chinese classics may take mathematics in the second year in place of oratory, and physics in the third year in place of Chinese literature. Those who wish to specialize in German law or French law in the imperial university may change their hours in foreign languages as follows: English 4 hours during each of the three years, and German or French 14 hours during the first and second years and 12 hours the third year.

COURSE B.

Subjects.	Number of hours.		
	First year.	Second year.	Third year.
Ethics.....	1	1	1
Chinese classics.....	2	2	2
Chinese literature.....	3	2	3
English language.....	8	7	4
German or French.....	8	7	4
Mathematics.....	5	4	6
Physics.....		3	3
Chemistry.....		3	5
Geology and mining.....			2
Drawing.....	4	3	2
Military science.....	2	1	2
Military drill and gymnastics.....	3	3	2
Total.....	36	36	36

Those who wish to specialize in botany, zoology, or geology, in the scientific college, or agriculture, may drop mathematics in the third year and substitute 4 hours' work in their special line of work. Those who wish to specialize in architecture, electrical engineering, naval construction, mathematics, physics, or astronomy, may drop 2 hours in chemical experiments in the third year and substitute in its place a 3-hour course in surveying. A 2-hour course in Latin in the third year may be elected by any who wish to specialize in zoology, botany, geology, agriculture, and veterinary science.

COURSE C.

Subjects.	Number of hours.		
	First year.	Second year.	Third year.
Ethics.....	1	1	1
Chinese classics.....	2	2	2
Chinese literature.....	4	2	2
Military science.....	2	1	2
Military drill.....	3	3	3
Mathematics.....	4	2	.....
Biology.....	4	3	.....
German.....	13	13	9
English or French.....	3	3	3
Physics.....	.....	3	6
Chemistry.....	.....	3	6
Latin.....	.....	.....	2
Total	36	36	36

Those students who before entering the college had made a study of German might have their work in foreign languages as follows:

Subjects.	Number of hours.		
	First year.	Second year.	Third year.
German.....	9	9	7
English or French.....	7	7	5

Students can not enter the imperial university until they complete one of the above courses, but there is little doubt but that these courses of study will be changed, as the number of hours required is too many to secure good results. Special stress is placed upon the acquiring of modern languages, so that in the university the students may be able to read with ease textbooks and reference books written in a foreign language. The English language has first place in the colleges. In the North China Herald of November 7, 1908, page 313, is the following interesting item: "As a sign of the times we notice

that the educational board has cut out the teaching of Japanese in the imperial provincial college at Kaifeng and that only English and French are now taught, together with Chinese. Whether this is the case in other provincial colleges or not, it seems to be one of the many indications that China is turning away from the leadership of Japan, and is determined to drink for herself from the fountains of learning from which Japan drank, and not be content any longer with pre-digested diet." In an editorial of the same paper of December 11, 1909, we read: "Not the least interesting feature of the curriculum of the Taian fu college¹ is the emphasis laid upon instruction in English. It is * * * the predominant western language in the education of the Chinese, and there can be no doubt that they are wise to adhere to one foreign language as the lingua franca of the Far East. To what an extent this position is already occupied by English is shown by the number of publications in our language connected with Chinese student life at home and abroad. Of these magazines we need only mention, by way of illustration, *The World's Chinese Students' Journal*, Shanghai." The regulations for the colleges require dormitories with studies and bedrooms provided for the students, and residences are to be provided for the president and professors. Laboratories, apparatus, museums, and libraries are also to be provided. An athletic field is required, but this may be located outside of the compound. A director is at the head of the college looking after all the finances and general organization and supervision. He is usually a man who has little or no knowledge of western sciences and is wholly lacking in pedagogical training. He has no knowledge of how a college should be supervised and seldom holds the office for more than a year. This position is used as one of the rounds of the official ladder where he may imburse himself while waiting for some more desirable position. Below the director is the president, who is usually a man of wider learning. He superintends the work done by the teachers, and makes recommendations to the director of ways and means of bettering the work. It is necessary at the present to employ foreign teachers to conduct many of the classes, as the number of qualified teachers is not equal to the demand. The regulations require that the instructors in the provincial college shall be such graduates of the university as have received high rank or graduates of a college or university in a foreign country. In the beginning of the establishing of these colleges, provision was made for the employing of any Chinese scholar thought qualified to teach in these colleges, and if it were not possible to secure a sufficient number of qualified Chinese instructors, to invite foreigners well qualified for the work.

¹ Provincial college of Shantung.

When I visited the provincial college of Chihli, at Paotingfu, in February, 1909, I found the college housed in good one-story Chinese buildings that had been used as the official palace of the viceroy before the removal of his office to Tientsin. I was entertained by my friend the president, Mr. Fei Chi Hao, a graduate of Oberlin College, with a master's degree from Yale University. He is well qualified for the position, which he had then held but a few months, but his hands are often tied because of the ignorance of the director. Were he at liberty to carry out his many excellent plans for improvement, the good results might easily be doubled without any increase in expenditure. I was told that the annual expenses of the college were about \$42,825. The director is supposed to receive 300 taels, or about \$215, per month, and each of the three foreign professors a like amount for the first three years and, if the contract is renewed, an increase of 50 taels per month. The president's salary is doubtless not less than that of the director. At the time of our visit the college enrolled 260 students, but this number included one class from the middle school. The middle-school students were required to pay 3 taels per month for board, but the college students were not required to pay for anything, even their books being furnished them. Some of the native teachers were graduates of the Tientsin Naval College and were doing good work. Classes were formed in both the literary and scientific courses. English is the principal foreign language, and the classes were doing good work. Some French was being talked, but no German, though it was hoped later to secure an instructor who could teach it. Some of the work in drawing was excellent. I found some of the classes in mathematics taught by lectures, the instructor working the problems on the blackboard and the students copying with a Chinese brush pen. One class in geometry had over 50 pupils. The laboratories were not well equipped. Apparatus of very inferior quality had been purchased of the Japanese at about one-half the price it would cost in Germany. I understand that Japan has been catering for the Chinese trade in school supplies, but as the Chinese appreciate and are not unwilling to pay for good quality, I believe Japan can not long keep this trade. The college had no library, but the reading room was supplied with 10 newspapers and magazines. The students studied in rooms having from 4 to 6 tables, with room for 8 students at a table. The dormitories accommodate 8 boys in a room. In the school year of 1907-8 there were in the college 207 students; 37 had graduated from the college. There were 9 teachers, 7 Chinese, 1 American, and 1 Englishman. The average number of students per teacher was 23. The cost per student for the year was 243.59 taels, or about \$174.

In December, 1909, in the provincial college at Chinanfu, Shantung, there were 268 students in attendance, 107 taking the literary course, 69 the scientific course, while 92 were in the preparatory course. All were taking English, and in addition German or French, mostly the former. The Peking Daily News reported July 17, 1908, that many provincial college students failed to secure their diplomas because they were unable to meet the requirements of the course.

The examinations of the graduate students of the provincial college are held in the presence of the viceroy or governor of the Province, a commissioner of education (hsueh cheng), and a chief examiner appointed by the Throne (ta chu kao). The following rewards are bestowed upon the graduates: (1) Those who are in the first grade are given the chu jen degree and may enter the imperial university if they choose; otherwise they are given the official title of chih chou and are candidates for positions in the different Provinces. (2) The second grade are granted the same honors as the first grade, except they are given the official title of chih hsien or district magistrate. (3) The third grade are given the same as the second grade. (4) The fourth grade are required to stay another year in the college for study, and if in another year's examination they fall below the third grade, or should they refuse to remain another year in the college, they are granted a certificate, but no degree or official title. (5) To the fifth grade no reward is granted.

UNIVERSITIES.

The educational code of China provides for an imperial university composed of eight departments or colleges: (1) Chinese classics; (2) law; (3) literature; (4) medicine; (5) sciences; (6) agriculture; (7) engineering; (8) commerce; and a graduate school to be located at Peking; also such other universities as may be established later by the Provinces, and which shall not be obliged to furnish instruction in more than three departments as outlined for the imperial university. So far there have been established, besides the imperial university, the Tientsin University, and the Shansi University, located at Taiyuenfu.

The imperial university up to 1910 has been confined to the work in its two preparatory departments, preparatory college (ta hsueh yu ke), and the preparatory technical college (ta hsueh shih ke). In the spring of 1909 about 100 students were graduated from these preparatory departments, but the colleges of the university were not prepared to admit students before 1910. On the 5th of March, 1910, examinations were held for admission to the university, but only a very few candidates presented themselves. This no doubt was largely due to so many of the advanced students having gone abroad for study, also that the provincial colleges have not been able to graduate many students, and again there are so many lucrative positions

now open to men who have the qualifications for entrance to the university that many are induced to forego a university training. The university is being built outside of Peking city, southwest of the Tartar city, near the fu Cheng Men. Two million taels, or about \$1,425,000, have been set aside by the board of finance for the construction of the buildings, and are to be paid in four yearly installments. The campus contains over 30 acres. The Government expects to allow about 200,000 taels for the annual budget. The president is under the control of the ministry of education, and has general charge of the university and its different colleges. Each college has at its head a dean, who exercises a general supervision over all matters connected with the college; a director of studies, whose duties are to superintend the instruction given in the college; a supervisor of the dormitories; and a superintendent to look after minor affairs. All these officers are responsible to the president. The professors and assistant professors of the university are to be graduates of the graduate school of the imperial university, or graduates of universities in foreign countries. At the opening of the university any Chinese student qualified to teach any special required line of work may be employed. Foreigners may also be employed. The university council is to be composed of the president, the deans of all the colleges, the professors, and assistant professors. The president of the university convokes the university council and presides at its meetings. Matters to be submitted to a meeting of the university council for its deliberation are as follows: (1) The institution or abolition of a course of study in any college; (2) the questions concerning the chairs in the university; (3) regulations for the internal government in the university; (4) granting of degrees of the graduate school; (5) questions put by the ministry of education or by the president of the university. Faculty meetings shall be held in each college, composed of all the professors and assistant professors. The dean of the college shall call the meetings and preside over them. The matters to be submitted to the faculty meeting of each college for its deliberation are as follows: (1) Curriculum of studies; (2) examination of students; (3) qualifications of candidates for degrees; (4) questions put by the ministry of education or by the president of the university. In case of a disagreement between the president and the university council in regard to matters concerning higher education, the question may be submitted to the ministry of education for settlement. All courses offered in the colleges cover three years' work, except the two courses in the law college and the course for physicians in the college of medicine, which require four years' work. The graduate school (*tung ju yuan*) requires five years' work. The present outlined courses are supposed to remain unchanged until after the first classes of the college have graduated, when the presi-

dent of the university and the deans of the colleges may be able to make intelligent changes to meet the future special needs to prepare men for the greatest service to the Empire.

The College of Chinese Classics offers 11 courses, each requiring 24 hours per week. These courses are so unique that we give an outline of the course in the Book of Changes (I Ching). The first course of study offered in the College of Chinese Classics, with the major subject in the Book of Changes (I Ching), is as follows:

Subjects.	Number of hours.		
	First year.	Second year.	Third year.
Book of changes	6	6	6
MINORS.			
Minor odes	2	1	.....
Chinese etymology	2	1	.....
Selections from the classics, sanctioned by the Throne	1	.....	.....
Complete Chinese history, sanctioned by the Throne	4	4	4
Comparative study of political institutions and laws of all the Chinese dynasties	1	2	3
History of education, China and foreign nations .....	.....	1	1
History of foreign sciences	1	1	2
Geography of China and foreign countries .....	.....	1	1
General history	1	1	1
One foreign language—English, French, Russian, German, or Japanese	6	6	6
Total	24	24	24

The other 10 courses in the Chinese classics are the same with the exception of a major subject. The following majors are substituted for the Book of Changes, and each course bears the name of the classic taken as the major: (2) Book of History (Shu Ching); (3) Book of Odes (Shih Ching); (4) Spring and Autumn Annals (Tso Chuan); (5) Rites of Chou (Chou Li); (6) Three Annals (San Chuan); (7) Manners and Rites (I Li); (8) Book of Rites (Li Chi); (9) Analects (Lun Yu); (10) Morals; (11) Mencius.

The object of these courses is to make a very careful study of all commentaries on the major subjects. On the Book of Changes (I Ching) there are 500 different commentaries; on the Book of History (Shu Ching), 150; on the Book of Odes (Shih Ching), 150; and the Spring and Autumn Annals (Tso Chuan) has 250 commentaries.

The college of law has two courses, political science and law. Each course requires 24 hours' recitations per week. The course is planned for four recitations per day. Sundays are now used for holidays in all the higher grade schools and colleges. Below we give the course in law:

The course in law.

Subjects.	Number of hours.			
	First year.	Second year.	Third year.	Fourth year.
Elementary law	2	1	1	.....
Laws of the present dynasty	4	4	3	2
Chinese history of criminal law	1	1	.....	.....
Chinese history of political institutions	3	3	3	2
Comparison of political institutions of foreign countries	2	2	2	2
Constitutions of foreign countries	1	1	1	2
Foreign civil law	2	2	2	2
Foreign criminal law	2	2	2	2
Commercial law of foreign countries	3	3	3	3
Diplomacy	2	2	3	3
International law	1	1	2	2
SUPPLEMENTS.				
Administrative law of foreign countries	1	.....	.....	.....
Domestic economy .....	.....	1	1	2
Political economy .....	.....	1	1	2
Total	24	24	24	24

The college of literature offers the following nine courses: (1) Chinese history; (2) foreign history; (3) Chinese and foreign geography; (4) Chinese literature; (5) English literature; (6) French literature; (7) German literature; (8) Russian literature; (9) Japanese literature. The number of hours per week in all courses is 24. The following is the outline for the course in English:

Subjects.	Number of hours.		
	First year.	Second year.	Third year.
English language and literature	9	9	9
History of modern English literature	3	2	2
English history	2	2	1
Latin	3	3	2
Philology	2	3	2
Education	2	2	3
Chinese literature	3	3	5
Total	24	24	24

The courses in French, German, Russian, and Japanese are the same in substance except substituting the special language of the course for English. In the other courses offered 6 hours per week of some one foreign language are required throughout the course. Besides the subjects named in the course of English literature are the following subjects offered in addition as electives: Chinese his-

tory, foreign ancient history, elocution, psychology, sociology, anthropology, Greek, Italian, Dutch, German, French, Russian, and Japanese. Surely enough is offered to satisfy the most ambitious scholar. Another proof of how little the framers of the educational system knew about western learning.

In the medical college two courses are offered, the course for physicians and the course in pharmacy. In the course for physicians courses in Chinese medicines are taught, but because of Chinese customs and ceremonies it is not possible to teach anatomy and osteology as is done in foreign countries, so these subjects are to be taught by use of charts and models. Stress is laid upon using the best Chinese medical books for reference. In one Government medical college in Peking courses were given in the use of both Chinese and foreign medicine—one by a quack Chinese doctor, the other by a Chinese who was a graduate of an American medical college. The remaining colleges and their courses of study are modeled after those of the Japanese universities, with some very slight changes to meet the demands of Chinese conditions. Below are arranged the colleges and courses of study under each, with a statement of the number of recitation hours required each week in the entire course. The credit for laboratory work is not given in the schedule. Under the physics and chemistry courses the statement is made that the lecture and recitation hours are few, but the hours for laboratory work are unlimited until the subject is thoroughly understood. In the college of agriculture the laboratory work is considered the more important. The Japanese universities have no college of commerce as have the Chinese. In Japan commercial law is included in the political science course.

COLLEGE OF SCIENCES.

Courses of study.	Number of hours.		
	First year.	Second year.	Third year.
Mathematics.....	17	16	12
Astronomy.....	17	14	10
Physics.....	16	21	20
Chemistry.....	11	13	7
Zoology and botany.....	32	34	26
Geology.....	15	16	3

COLLEGE OF AGRICULTURE.

Agriculture.....	22	22	15
Agricultural chemistry.....	18	14	9
Forestry.....	22	22	9
Veterinary medicine.....	20	32	24

COLLEGE OF ENGINEERING.

Courses of study.	Number of hours.		
	First year.	Second year.	Third year.
Architecture.....	36	34	30
Mechanical engineering.....	36	34	1
Naval architecture.....	35	33	35
Technology of arms.....	32	34	34
Electrical engineering.....	36	37	1
Civil engineering.....	36	30	32
Chemical engineering.....	41	36	32
Technology of explosives.....	35	35	11
Mining and metallurgy.....	36	36	32

COLLEGE OF COMMERCE.

Banking and insurance.....	24	24	24
Trade and traffic.....	24	24	24
Taxes and customs.....	24	24	24

Each student upon entering the university must present a bond signed by an official living in Peking, but who is a resident of the same Province as that from which the student comes. Dormitories are to be provided for all the students. The officers and members of the faculty are about the same as those in the Japanese universities.

The graduate school admits graduates of the colleges and applicants who are not graduates of colleges, who can pass the examination for admission given by a committee appointed at a faculty meeting of the college to which his chosen subject belongs. A graduate student is placed under the supervision of the dean of the college chosen, and the dean may appoint a professor or professors to superintend the student's investigations. The student at the end of each college year must make a report of the results of his investigations to the dean of the college, and the dean presents it to the faculty for inspection. If the work of the student is not satisfactory, he may be dismissed by a vote of the faculty. After a residence of two years in the graduate school the student may secure permission to live outside of the city, providing it does not retard his graduate work. At the end of five years the student may present a thesis, and if approved by the faculty it shall be presented to the president of the ministry of education, who will memorialize the Throne, recommending the conferring upon the student suitable rewards.

The Tientsin University in January, 1908, enrolled 89 students, 39 having graduated. Its faculty numbered 14, of whom 5 were Americans, 2 Japanese, and 7 Chinese, making an average of 6.3 students per teacher. The cost per student for the year was 764

taels, or about \$545. There were that year 5 classes, 1 in the law college, 2 in the civil engineering, and 2 in the mining course. In the summer of 1908 modified curricula were submitted through Viceroy Yang to the ministry of education and received their sanction. Graduates of the provincial college at Paotingfu are sent to this university, but up to 1909 these students were required to take some preparatory work before entering the university courses. President Wang has studied in England and is a most able administrator, and is much respected by the faculty and students. There is little doubt but that the highest grade of all Government college work is being done in the Tientsin University. Up to 1909 all of its work was being carried on in one-story Chinese buildings, but these will soon give way to more convenient buildings of foreign architecture. Its outlook is most promising.

The Shansi University has a unique history. In the settlement of the Boxer troubles of 1900 the Chinese plenipotentiaries asked Dr. Timothy Richards to aid them in coming to an agreement with the foreign powers as to the reparation to be made for the massacres in the Province of Shansi. After consultation with various missionaries in Shansi, Dr. Richards proposed that instead of indemnities for the lives of those missionaries who had been murdered in the outbreak the Government should pay annually for 10 years the sum of 50,000 taels as a fine toward the founding of a university for Shansi Province, and by its teachings end the ignorance which had been the chief cause of those outrages. The Government accepted the proposal and placed the administration of the university and its funds in the hands of Dr. Richards for a period of 10 years, when the institution was to revert to the provincial government. In 1902, when Dr. Richards reached Taiyuenfu, he found that a college had been started in the city by the provincial authorities in response to the edict commanding the establishment of colleges in each provincial capital. A compromise or understanding was agreed to by which the Government consented to the two institutions being united to form a university. The college to be established by Dr. Richards was to form the western department, which should have the supervision and control of all western subjects of study, and the college already started was to be the Chinese department of the university, and to confine its work to the teaching of Chinese studies. The finances and management of the western department are under the control of foreigners, while those of the Chinese department are under the supervision of the Chinese. The work has of necessity been confined to the grade of teaching found in the provincial colleges. The college has an excellent foreign faculty, and their work has been of a high grade. Suitable college buildings of Chinese architecture were early constructed. The western department has a preparatory

school of three years and college courses in law, medicine, science, literature, and engineering. In 1905 there were 400 students in attendance in both departments. The annual expenses of the university were 92,000 taels. The hsiu tsai (A. B.) degree was required of all students for entrance. In 1906, 300 students competed for 5 vacancies in the western department. In 1908 there were 200 students in this department. The graduation examinations of the imperial university are to be held in the presence of the president of the ministry of education (Hsueh Wu Ta Chen), together with a commissioner appointed by the throne (Tsung Tsai). The graduates are divided into the usual five grades: (1) The first grade is honored with the Hanlin degree (LL. D.), and may enter the graduate school; (2) the second grade also receives the Hanlin degree, but of a little lower rank than that given to the graduates of the first grade; these graduates may also enter the graduate school should they desire to do so; (3) the third grade receives the chin shih (Ph. D.) degree, and is given an official rank of the sixth order and assigned to some one of the different boards; (4) the fourth grade is given the chin shih degree, but is required to take another year's work at the university and another examination, but should any prefer not to remain for study, or in the following examination fail to raise their grade, they are given the official rank of a district magistrate and appointed to some position in the provinces; (5) the fifth grade receives no reward. No rewards have yet been determined upon for the graduates of the graduate school. These men, having completed the entire 25-year outlined course of study for the national schools, should be granted higher honors than the Hanlin degree, and when there are candidates for these honors the ministry of education promises that suitable rewards shall be bestowed upon all successful candidates.

CHAPTER VII.

NORMAL, TECHNICAL, AND MISCELLANEOUS SCHOOLS.

NORMAL SCHOOLS AND COLLEGES.

When the modern educational system was established in China the Government realized that the various schools to be successful must have qualified teachers. Accordingly it at once adopted the two possible methods of securing them—the one, that of preparing teachers itself, and the other, that of sending students to foreign countries for training. Normal schools were opened in the provincial capitals and later in the larger centers. A school was established under the general supervision of the imperial university, which later developed into a normal college and is no longer under the control of the university. Owing to the urgent need of teachers of the English language for the middle schools of Chihli Province, the Tientsin University in 1906 added a normal department, which was supplied with students taken from the various classes in the university. At the end of a year 25 graduates had completed the course laid down and were distributed among the middle schools of the Province. A second class was formed in 1907, composed of students sent to the university from the provincial college. Thirty-six students received their diplomas in 1908, after which the normal work in the university was discontinued. Students were selected and sent to study in the normal schools of Japan, and upon completing their courses of study in Japan they returned, in many cases in less than a year, and were assigned positions in the schools of the Province. Most of the Provinces sent students to the normal schools of Japan, until at one time they were numbered by the thousands. Meanwhile China lost no time in establishing normal schools by the hundreds throughout the Empire. By 1908 in Chihli Province alone, outside of Peking city, there were 98 normal schools, having 165 instructors, 3,448 students, 5,608 graduates, with annual receipts of 270,672 taels, or \$193,337, while the two normal colleges reported 46 instructors, 935 students, 533 graduates, and annual receipts of 156,228 taels, or \$111,591. The average annual expense that year for each student in the normal school was 48.21 taels, or \$34.43, and in the normal colleges 170.33 taels, or \$121.66.

The normal schools were established to train teachers for the lower and higher primary schools. Graduates of the higher primary

four-year course are admitted to the normal schools. At first there being no graduates of higher primary schools, students were selected from the literati, who were especially good in Chinese composition. It is expected that each prefecture and district will provide and maintain a normal school that will accommodate at least 150 students. The pupils were not to be required to pay tuition, but those who wished could be self-supporting. The subjects taught in these schools are 12 in number—ethics and morals, Chinese classics, Chinese literature, pedagogy, history, geography, mathematics, natural sciences, physical sciences, penmanship, drawing, and drill. Two courses of study were outlined—a long course and a short course. The long course covers 5 years of 45 weeks, having 36 hours' recitations per week. Special pains are taken to train pupils to be patriotic, to be faithful to the Emperor, and filial to parents. The students are instructed to restrain their words as well as their actions, and to observe such laws of health as will develop in them strong constitutions. They are also taught to form habits of study and to do independent work. The pupils entering the five-year course of study are to be between the ages of 18 and 25. Those entering the short course between 25 and 30 years of age. During the first four months of a student's residence he is put upon probation, and only worthy students are retained. Necessity compelled the normals at first to offer short courses of study in order to secure temporarily teachers for the primary schools. Many schools offered one year and a few schools at first offered six months' courses. The Government requires the following service of graduates of normal schools: Government students graduating from the long course are required to give six years' service teaching in the schools to which they may be assigned; self-supporting students are required to give three years. Government graduates of the short course give three years, while the self-supporting students give but two. Should a graduate refuse to render this service, he must pay to the school the full amount it has cost to educate him. After giving the required time of service, the student may, if he wishes, enter the normal college. In the normal schools the teachers and assistants are chosen from graduates of the normal colleges and from foreign normal colleges. Most of the foreign teachers are Japanese. In the beginning it was necessary to employ some Chinese teachers who had received no normal training. Graduates of the five-year course receive the following degrees and rewards: To the first grade, "pa kung;" second grade, "yu kung;" third grade, "lin kung." The first and second grades are made instructors in the higher primary schools, and the third grade are made assistant instructors.

The regulations required that a normal college should be established at Peking and at each provincial capital, which would accom-

moderate at least 240 students. Graduates of the normal and middle schools were to be admitted. These colleges have three departments, (1) common school studies or a general course; (2) special studies; and (3) graduate studies. The general course requires 1 year of 36 hours, and gives instruction in 8 subjects: Ethics, Chinese classics, Chinese literature, Japanese language, English language, logic, mathematics, and military tactics. The department of special studies offers 4 courses of 3 years each of 36 hours recitations per week. These courses are intended to prepare teachers as specialists in certain subjects. In the A class 13 subjects are required: Ethics, Chinese classics, Chinese literature, history, pedagogy, psychology, authors of Chou and Chin dynasties, English language, German or French language, logic, zoology, physical sciences, and military tactics. The following is the outline of course B:

Subjects.	Number of hours.		
	First year.	Second year.	Third year.
Ethics.....	2	2	2
Chinese classics.....	6	5	4
Chinese literature.....	1	1	1
Pedagogy.....		4	8
Psychology.....	1	1	
Mathematics.....	6	6	6
Physics.....	5	6	7
Chemistry.....	4	5	5
English language.....	3		
Drawing.....	2		
Mechanics.....	3	3	
Military tactics.....	3	3	3
Total	36	36	36

Course C has 12 subjects offered: Ethics, Chinese classics, Chinese literature, pedagogy, psychology, geography, history, political science, finance, English language, zoology, and military tactics. German is elective.

Course D offers 14 subjects: Ethics, Chinese classics, Chinese literature, pedagogy, psychology, botany, zoology, physical science, mining, geology, agriculture, English language, drawing, and military tactics. German and chemistry are offered as electives.

In the graduate department the following 10 subjects are offered, of which the student must elect at least 5: Ethics, pedagogy, school administration, school supervision, aesthetics, experimental psychology, school hygiene, professional education, child study, and practice teaching. After completing his subjects the student is required to write a thesis upon his work. The course is one year in length, and

the number of hours is left to the discretion of the faculty. Students who wish to enter the general course must be recommended by their home prefect or magistrate. Each student must furnish two guarantors, acceptable to the school, that he will faithfully discharge his duties. He must also declare his intention to make teaching a profession and promise to render the service required by the Government after his graduation; namely, to serve for a period of six years, the first two years to be at the disposal of the president of the ministry of education and the viceroy or governor of his Province, and to accept any position to which he is appointed. Any graduate refusing such service shall be required, as a fine, to pay back the full amount of the cost of his education. After performing the full period of service, the student may, if he so desires, enter the university. Connected with the college is to be a model primary school and also a middle school. The professors of the normal college are to be graduates of high standing of special colleges of the imperial university, or graduates of normal colleges or universities of a foreign country. It was allowable when the colleges were first opened to employ any Chinese teacher thought to be qualified. Graduates of the normal college are divided into five grades: The first three grades receive the degree of chu jen (M. A.) and the honorary title of the "Fifth Order," and are appointed professors in the middle and normal schools. The other two grades are treated as in other schools.

The normal college at Paotingfu is located about three quarters of a mile outside of the city wall, and was one of the first normal colleges in China. Most of the teaching was done, at the time of my visit, by the teacher lecturing and the pupils taking notes. In one class of Chinese history the teacher had his lecture printed, and each pupil was furnished a copy to consult during the lecture. The classes were very large, too large, in fact, to obtain the best results. The laboratories were fairly well equipped. Courses were at that time being offered of one-half year, one year, two years, three years, and four years. Only one four-year class had graduated. Doubtless this four-year course contains some work that belongs to the normal school. Courses were offered in vocal and instrumental music, also in manual training and kindergarten work.

The North China Normal College is located at Tientsin, and has an excellent equipment. In February, 1909, I was told that it enrolled 330 students, and that there were 270 students in its graduating class. This college is said to be the largest and best in the Empire. Its faculty was composed of 8 Japanese and 4 Chinese professors. Sixty-six students were pursuing courses in both the Japanese and English languages. The students ranged from 20 to 35 years of age. The laboratories are well fitted for all kinds of normal-college work. It also has a library and reading room.

While good work is being done in other schools, it is expected that in the near future the National Normal College, just built in the southern city in Peking, will be the model for all other normal colleges in the Empire.

TECHNICAL SCHOOLS AND COLLEGES.

The fundamental object in establishing technical schools is to encourage Chinese agriculture, commerce, architecture, and engineering. The Government hopes as soon as possible to establish outside of the university colleges the following technical schools: (1) Teachers' technical training schools of the same grade as those of normal colleges; (2) polytechnical colleges of the rank of provincial colleges; (3) middle technical schools of the same rank as the middle schools; (4) primary technical schools of as high rank as the higher primary schools; (5) fishery schools of the same grade as the middle school; and (6) industrial schools having courses equivalent to the courses of primary and middle schools. The main difficulties in the establishment of these schools have been lack of qualified teachers and funds to support such schools. The Government has sent students abroad to prepare for teaching in these schools and has urged the wealthy to contribute for the establishment of such schools. We have already referred to the technical departments of the universities. In the Imperial Polytechnic Institute of Shanghai courses are offered in civil, mechanical, electrical, and marine engineering.¹ The Tangshan Engineering and Mining College is located at Tangshan, in Chihli Province. It is supported by the Imperial Railways of North China and the Chinese Engineering & Mining Co. It has excellent buildings, a fair equipment, and its location, being near to the railway shops and the mines, gives its students in engineering and mining special advantages. It is expected to graduate its first class in 1911.

In the report for Chihli Province for the year ending February, 1908, we find reported 5 technical schools above middle schools with an attendance of 433 students and having graduated 182 students. The number of teachers employed was 44; the amount received for the annual expenses was 272,319 taels, or about \$123,000; the annual cost per student was 177.41 taels, or \$126.72. There were that year in Chihli 17 technical and special primary schools, enrolling 446 pupils, having graduated 38. The number of teachers employed in these schools was 40 and the cost per pupil for the year 41.66 taels, or \$29.74.

Agricultural schools and colleges were among the first schools to be established in the Provinces. Nearly every Province has its

¹ North China Herald, Aug. 21, 1909, p. 449.

agricultural college, many of the larger towns have their agricultural schools, and many of the smaller towns have half-day agricultural schools, until to-day there are many of these schools scattered over the Empire. In many of these larger institutions the instruction has been given by Japanese professors. Provincial agricultural boards have been organized, also branch boards in many of the fus, chous, and hsien. Some of the Government students studying abroad are making a specialty of agriculture. Mr. M. H. Tang, who graduated in 1908 from Cornell University with a master's degree, is now the director of the agricultural college at Shanghai. Often the directors have been men who had no knowledge of agriculture or of college management. The day is not far distant when China will be able to have her own staff and faculty of trained men for each of her agricultural colleges.

The Kuang Si Provincial Agricultural College, located outside of Kueilin was opened in May, 1909, with accommodation for 140 students. Its director, a capable, enlightened officer, hoped to engage German specialists as instructors for the college. It has been stated that agricultural commissioners were to be appointed for each Province to supervise all agricultural schools.¹

A few schools of commerce are being established outside of the imperial university, and are under the control of the board of commerce. A large commercial college with commodious buildings has just been established in Peking to accommodate several hundred students.

Many industrial schools of various grades have been established. One of the first was a private industrial school established soon after the Boxer troubles by Huang Sze En, a Hanlin,² in the Southern City of Peking, for the benefit of those without employment, and several trades were taught. This school, although still in existence, has been surpassed by a number of Government schools that have lately been established. There are in Peking at least 7 schools of this grade, and outside of the city there are several being established for the Manchu people. These schools have a twofold purpose, namely, to educate boys and men to do skilled work in many industries and also to train men who may teach them to others. The board of commerce has established in Peking one of these training schools at a cost of 100,000 taels, or over \$70,000. It is well equipped and teaches spinning, weaving, glass blowing, carpentry, dyeing, leather work, well digging, rattan work, embroidery, drawing, and lacquer-

¹ Pekin Daily News, December 9, 1908.

² This capable man, because of his proforeign tendencies, was imprisoned under sentence of death in the summer of 1900. After the relief of Peking he was rescued from the imperial prison through the foreign legations. Since the establishment of this industrial school his former rank has been restored and additional honors conferred upon him by the Imperial Government.

ing. It enrolls about 500 students, who come from all parts of the Empire. There is another school in the city under the control of the same board, which gives a more general education in addition to teaching the above industries. It has about 30 Japanese instructors and 300 students. Connected with this industrial school is a higher technical school, with about 200 students who are being prepared in engineering. In 1909 there must have been at least 2,000 students in the industrial schools of Peking. Tientsin and other large cities have established industrial schools similar to those in Peking.

The North China Industrial College is located at Tientsin, and has good buildings and equipment. In February, 1909, it had about 100 students. Its faculty was composed of 1 European, 1 American, 2 Japanese, and 7 Chinese. I was informed that a student, after completing the course of study in chemistry, would be able to enter the junior class in chemical engineering at Cornell University.

Many small schools teaching one or two trades have been established in the smaller cities and towns from a business or philanthropic motive, and are doing a good work by training penniless persons, making them self-supporting.

MISCELLANEOUS SCHOOLS.

The Boxer outbreak closed the Tung Wen College, and the College of Languages (I Hsueh Kuan) was organized to take its place and carry on practically the same work, preparing students to fill the same positions as did the Tung Wen College. The College of Languages is located in the Tartar City of Peking, and offers a course of 5 years of 36 hours per week to 120 students, who are given free tuition, board, and books, and also to special students, who pay tuition and other expenses connected with the college. Tuition was \$1.50, and board from \$1.40 to \$2.50 per month; dormitory privileges were \$5 per year, and \$10 had to be deposited for uniforms. English, French, German, Russian, and Japanese languages are taught, and each student is required to specialize in one of these languages. Graduates of the middle schools, after taking an entrance examination, may be admitted to the College of Languages. At the time of the opening of the college, students who had some knowledge of a foreign language were admitted after an examination. Students of the Chin Shih Kuan, who understood a foreign language, could be admitted. In May, 1907, there being so few graduates of the middle schools, the ministry of education granted permission for students who had completed two years' work in the middle schools to be accepted as students of the College of Languages.

Course of study for the College of Languages.

Subjects.	Number of hours.				
	First year.	Second year.	Third year.	Fourth year.	Fifth year.
Ethics.....	1	1	1	1	1
Chinese literature, classics, and composition.....	3	3	2	2	2
History—Chinese, Asiatic, and western.....	2	2	2	2	2
Geography—Chinese, Asiatic, and western.....	2	2	2	2	.....
One foreign language, English, French, Russian, German, or Japanese.....	16	16	18	18	18
Mathematics.....	4	4	3	3	.....
Physiology and mineralogy.....	2	.....	.....	.....	.....
Physics.....	2	.....	.....	.....	.....
Drawing.....	2	2	.....	.....	.....
Military drill.....	2	2	2	2	2
Botany and zoology.....	.....	2	.....	.....	.....
Chemistry.....	.....	2	.....	.....	.....
Diplomacy.....	.....	.....	3	3	3
Political economy.....	.....	.....	3	3	3
Education.....	.....	.....	.....	.....	3
Geology.....	.....	.....	.....	.....	2
Total.....	36	36	36	36	36

¹ Hsueh Pu Kuan Pao, vol. 38, Dept. 3, p. 188.

In February, 1909, when visiting the college, I was told that the enrollment was 360; that the English department registered 130 students; the German, 50; the French, 110; and the Russian, 60. There was at that time no Japanese department, but all students were required to devote one or two hours per week to the study of that language. The English classes were taught by two foreign professors, one being a doctor of philosophy from Yale, and three Chinese assistants; the French was taught by two foreign professors and one Chinese assistant; the German, by a foreign professor and a Chinese assistant; and the Russian by a Chinese professor. The salary of the foreign professors was from \$400 to \$645 Mexican per month. The Chinese instructors received from 50 to 150 taels per month. The old Tung Wen College was supported by the imperial maritime customs, but the College of Languages is supported and superintended by the ministry of education. The monthly expenses were reported to be about 7,600 taels, or \$5,429. The director of the college was a member of the ministry of education. He was supposed to visit the college three or four times a week, and he receives no salary for his services to the college, but his traveling expenses are allowed. I learned the following facts in regard to the second class in English, which contained 40 students: They represented 15 provinces; the oldest was 33 years of age, the youngest 19, the average age was 23 years; 27 were married, some having as many as 4 children; 14 had Chinese degrees and 2 had Chinese official titles. In the spring of 1909, 39 students were graduated and granted the degree

of chu jen (A. M.). Some of these graduates were assigned to the ministry of education, and the others were divided by lots among the following ministries: Foreign affairs, agriculture, and commerce; but in case any Chinese minister abroad wished additional help in his legation he had a right to ask the ministry of foreign affairs to select him one of these graduates.¹

In November, 1907, Viceroy Tuan Fang established a provincial college of languages at Nanking. He is reported as having given 6,000 taels toward its establishment. It admitted 120 students. French and German are the languages emphasized. Russian was not taught. Colleges of languages have also been established in Tientsin, Hu Peh, and Manchuria. Ministers accredited to foreign countries are expected to select their interpreters from the graduates of the College of Languages or the provincial colleges of languages. The professorships of languages in the various schools in the Empire are to be filled by graduates of the highest grade of these colleges of languages.

The Chin Shih College was established in Peking to give the chin shih (Ph. D.) and Hanlin (LL. D.) graduates of the old system of Government examinations an opportunity to study western learning for a period of three years, believing that a general education was necessary to prepare them for their future official duties. Men over 35 years of age had the right to petition to be excused from attending the college, in which case they were given the title of a district magistrate and distributed among the Provinces for official duty. Those below 35 years of age were compelled to attend the college. Each student was granted an annual stipend of 240 taels if he were a Hanlin or a chung shu, and 160 taels was granted to those of lower degree.

Course of study for the Chin Shih Kuan.

Subjects.	Number of hours.		
	First year.	Second year.	Third year.
History.....	5	2	.....
Geography.....	5	2	2
Physics.....	2	.....	.....
Pedagogy.....	4	.....	.....
Law.....	4	5	6
Political economy.....	4	3	.....
Chemistry.....	.....	2	.....
Diplomacy.....	.....	3	.....
Commerce.....	.....	3	2
Military science.....	.....	4	2
Architecture.....	.....	.....	2
Agriculture.....	.....	.....	6
Total.....	24	24	24

¹ Hsueh Pu Kuan Pao, vol. 84, dept. 1, pp. 3-6.

Students who successfully complete the course of study are examined by an imperial commissioner and the president of the ministry of education, and those who pass the examination are introduced to the regent and later receive official appointments. Many of these students have been sent abroad to study and upon their return are examined. On March 15 and 17, 1909, four of these students were examined not only on the special studies but also in Chinese history and literature.¹

A number of law schools have been established in the Empire. The two most prominent ones are the law school in Peking, which had in the beginning of 1909 about 740 students training for the board of law, and the North China Law School, in Tientsin, which now occupies fine buildings that were constructed in 1907. This law school was established in 1906 for the purpose of giving a three-year course in the study of foreign law and treaties, preparing the students for diplomatic service. After the graduating of the first class changes were made by imperial sanction, and the school became a provincial law school and receives not only Government students, but hopes also, by enlarging its faculty, to receive many self-supporting students. In 1909 there were 4 Japanese and 16 Chinese professors. All the students were required to study the Japanese language. It has a very fair library of Chinese and Japanese books. The prospect of soon having a constitutional government for China will stimulate many young men to study law, and doubtless the time is not far distant when every Province in China will have its provincial law school, modeled after that of North China.

"Chinese medicine, which began so well, has made no progress during the last 2,000 years. It has, on the other hand, greatly degenerated both in dignity and influence, until at the present time there abounds all over the Empire an enormous number of illiterate and unscrupulous quacks, who * * * trade entirely upon the superstitions and fears of their numerous clients."² To show the strong hold that the old system of medicine has on the people, we quote the following from the North China Herald, May 1, 1909, page 246: "Chenchow can now boast of a new medical school with two teachers and five medical students. The school is opened in a new temple just completed. The teachers are both Chenchow men and know nothing of medicine except what they have learned from reading their own Chinese books and practice. The official in speaking of the medical profession here said there were no good doctors, and the new school was provided to enable all those who wanted to

¹ Hsueh Pu Kuan Pao, vol. 82, dept. 1, p. 1.

² "The position of medical science in China as compared with that of the West." We Lien Te, M. A., M. D. (Cambridge.) The World's Chinese Students' Journal, vol. 2, No. 1, p. 7.

practice to get a certificate, and thus give the profession a legal standing. The money, something over \$1,000, was raised by subscription." And again from the same paper, May 29, 1909: "According to a Chinese local contemporary the members of the above-named institution, 'The College of Imperial Physicians,' are too conservative in their education and training, and some of them are even unacquainted with modern hygiene and its principles. Owing to this, a grand councilor is said to have recently advised Prince Ching of the necessity of making some improvements toward better training of the members of the college in view of the importance which should be attached to human life."

One of the greatest needs in China is more medical schools. It is strange that the Government, having displayed so much activity in opening schools for science, language, engineering, the army and navy, should have been so backward in establishing a national system of medical education. It has the North China Medical College and the Army Medical College at Tientsin, where surgeons are prepared for army and navy service. The North China Medical School has a three-year course of study, and in March, 1908, graduated 35 students in the first grade; these received the degree of lin sheng; 21 made second grade and received the tseng sheng degree.

Doubtless the best medical college in all China is the Union Medical College of Peking, formed by the union of the two missionary medical colleges of the North China Educational Union and the Peking University. It has a large faculty, composed of graduates of the medical colleges of the leading American and British universities. All instruction is given in Chinese and covers a five-year course of study. The late Empress Dowager contributed 10,000 taels toward its establishment and the Chinese Government has promised to make annual contributions toward its support. It is the only missionary medical college in China which has received the sanction of the Throne and whose graduates are entitled to enter the Government examinations and receive Government degrees and rank. Its first class will graduate in 1912.

The Nobles' School in Peking was opened June 15, 1906, for the sons of nobles and the sons of the first and second class officials. The school provided for 160 students, to be divided into four classes, according to scholarship. The course of study at first was planned for five years, but this was changed to three years. The first class, of 96 students, graduated in 1909, the ministry of the army conferring first grade upon 70 and the second grade upon 26. It is expected that many of those young men will go abroad to study in military or naval academies and later enter the Chinese Army and Navy. Prof. Sharp, in *The Educational System of Japan* (p. 330), writes: "It was hoped that the young peers would take to the army and navy, but com-

paratively few succeeded in entering them, as the examinations are stiff and they enjoy no privilege." Let us hope that the sons of the nobles of China may prove themselves more capable than their Japanese neighbors.

Military schools have been established in several of the Provinces. In 1909 there were 18 military schools (lu chin hsiao hsueh tang) in the Empire. In Peking, on the Mei Chang Street, is located the school to be the model for all others. It has a three-year course of study, and in February, 1909, enrolled 387 students. Its first class of 180 students was expected to enter the newly established military school (Lu Chin Cheng Hsueh Tang) for two years' study. There are three other large schools or academies at Nanking, Wu Chang, and Hsi An Fu. In 1900 the military school at Paotingfu graduated 400 students.¹ The ministry of war is now contemplating the establishment of a regulated system of national and provincial military schools. A military commission is now visiting foreign countries examining their military systems and schools. A naval commission has just returned from a tour of inspection of the naval systems and schools of foreign countries, and the ministry of admiralty are now considering the reorganization of their naval schools and are planning to establish a national system of naval academies and schools. At present there are naval schools at Fu Chou, Tientsin, Chefoo, and Nanking. We have noted that military drill and tactics are receiving much attention in the curricula of the Government schools of China. This drill has developed a military spirit in all the schools, as well as a spirit of patriotism. It has also created more respect for military officers and the army. The Chinese have always been a peace-loving people, and we believe they are likely to remain such, but they see the necessity of providing for self-preservation, and we may expect in time that China will have at her command one of the best organized and best disciplined, and the largest army in the world, which will place the balance of power in her hands, and may we not hope to secure through her arbitration universal peace?

The Government in 1908 sanctioned the memorial recommending the establishment of a customs training college in Peking, to be under the control of the imperial customs, for training Chinese young men for positions in the imperial maritime customs and postal system. The entrance requirements are English and Chinese. Students between 16 and 22 years of age are admitted by competitive examinations. The course comprises four years of study, after which the successful students are to be drafted into the indoor staff of the customs. It is expected that in time these graduates will replace the foreign staff. Mr. Brewitt-Taylor, a member of the customs staff.

¹ North China Herald, May 29, 1909, p. 487.

noted for his scholarship and ability, has been appointed the director of the college.

The ministry of finance, having secured the sanction of the Government, are expecting to open a school of finance in Peking in 1910 which will accommodate 130 students. The course will be given in Chinese and English. A preparatory school will be connected with it.

The Chinese Students' Monthly, volume 3, Nos. 7-8, page 279, contains the following item concerning a railway school in Peking: His Excellency Hai-huan, director general of the Tientsin-Pukou Railway, has obtained the sanction of the ministry of posts and communication to establish a railway school in Peking, having for its object the training of men for service on that road. The school will be divided into two departments, namely, traffic and telegraph. Taotai Yuan Chang Kun has been appointed director general of the school. The site of the school is in the vicinity of Chungmen Gate, and the estimate for the maintenance of the school is 50,000 taels per annum. Taotai Yuan is a returned student from the United States and a member of the Chinese educational mission which was sent over in the middle of the seventies."

A school for the training of diplomats, known as the "Hautsai Kuan," is reported as having been established in Peking, from which recruits will doubtless be drawn for the foreign service.¹

On February 20, 1909, the board of the interior (min cheng pu), having memorialized the Throne, it was decided to establish a police high school in each provincial capital, and police training schools in all the fus and hsiens.² The North China police high school was established in Tientsin in 1902. Men who are able to read and write are taken as students. The number of students in the two-year course is limited to 100, and in the one-year course to 160. It had up to 1909 received 766 students, 676 having graduated. The provincial police school for Chihli was established at Paotingfu in 1906 by Viceroy Yuan Shih Kai. In this school a course of six months and another of a year are offered. It is able to accommodate about 500 students. In 1906 there were over 300 attending. These schools have provided well-trained police for the smaller as well as for the larger cities of the Province, a very marked contrast to the incompetent police seen before 1900. The very best order is now maintained upon the streets of Peking and Tientsin. In the Tai Yuenfu police school, as early as 1904, 17,000 taels were spent to educate 112 students. Its teaching staff was made up of three Japanese and two Chinese teachers. Similar schools have been established in other Provinces.

¹ The World's Chinese Students' Journal, vol. 4, No. 1, p. 18.

² Hsueh Pu Kuan Pao, vol. 83, dept. 3, p. 3.

The president of the ministry of the interior has decided to establish a detective school at Peking for training men for espionage service in the ministry. The pupils are to be chosen from the first-grade graduates of the police schools.¹

In Tientsin I visited in February, 1909, an institution known as a reformatory school. The following five classes of persons were admitted: (1) Men having no means nor money; (2) orphans above 10 years of age without home or friends; (3) incorrigible children sent by their parents to the school for discipline; (4) people who have become stranded in Tientsin; and (5) petty thieves, both old and young. Those between 10 and 20 years of age were taught arithmetic, writing, reading, and athletics. Suitable lectures were provided for all the inmates, and they were taught a number of trades, such as are being taught in the industrial schools. At that time I was told there were about 500 in this school. We understand that similar schools are being established in other large cities of the Empire.

During the last decade great changes have been inaugurated in prison life. "Model prisons," with schools connected with them, are now being erected in most of the Provinces. Instead of keeping the prisoners, as was the custom before 1900, chained in filthy, insanitary buildings, they are now placed in modern buildings similar to those of Japan, and are required to work and live a more wholesome and natural life. The spirit in the prisons is reformatory and the prisoners are placed in the prison schools, where they are taught trades. Yuan Shih Kai, when viceroy of Chihli, was the first to institute these changes.

The Government has shown great wisdom in establishing a preparatory school in Peking for students preparing for the "American indemnity scholarships." The course of study will include all those subjects required for entrance to the colleges of the best universities of the United States. His Excellency Tang Kai San, a former Yale student, a man of the highest character and attainments, has been appointed the director of the school, and we are informed that a corps of 18 American teachers, composed of an equal number of men and women, will constitute the faculty. From this school will be sent to the United States well-prepared, earnest, enthusiastic students, who will be sure to rank high and win honors in the American universities. Let us hope that the training they will receive in the United States will fit them to become great national leaders upon their return to China.

His Excellency Chang Chih Tung, when viceroy of Hu Kuang, established "colleges for the preservation of the old learning" (Tsun Ku

¹ The Chinese Students' Monthly, vol. 4, No. 4, p. 227.

Hsueh Tang). Their object is to encourage students to specialize in the Chinese classical learning, much as was done in former days. It is reported that other Provinces have followed his excellency's example and founded similar institutions. Did the ghost of the past arise to disturb Chang Chih Tung's dreams of modern education in China—the one who was the author of "China's Only Hope," the founder of some of her early modern schools, one of the framers of her present educational system, and the general controller of the ministry of education?

One of the most important features of the revolution in Chinese education is the provision now made by the Government for female education. Under the old régime no provision was made for the education of women. In rare cases an indulgent father taught a brilliant daughter; but, as a whole, the women of China were altogether uneducated. To-day the most enlightened Chinese realize that the future greatness of their Empire depends largely upon the education of their girls as well as of their boys. They have discovered that no country is great where the women are ignorant, and the educational commissioners have learned that the greatest civilization and material progress are in those countries where women are the most highly educated. They have also discovered that the educated woman makes the best wife and mother. There have been some strong women in China, like the sisters of Prince Su, who, having been endowed with good intellects and with not a little independence, have started private girls' schools of their own and have used every means to encourage the establishment of other schools. These and other strong women have worked until they have secured Government recognition for girls' schools. Tuan Fang, before and after his going abroad, urged the establishment of female education in China. When the commissioners were in the United States they were greatly impressed by the advantages in education offered American women, and made most favorable reports to the Throne. The late Empress Dowager was greatly interested in female education, and lost no opportunity of learning all she could of western methods from American women concerning female education in the United States. As a result to-day there are Government, public, and private girls' schools established in almost every Province. Government provision has been made for primary and middle schools, normal schools, and colleges for women.

By the beginning of 1908 there were outside of Peking 121 girls' schools in Chihli Province. Of this number, 43 were Government schools, 39 public schools, and the remaining 39 were private schools. The schools enrolled 2,523 pupils, and were taught by 168 teachers, having graduated 95 students. The total annual income from all sources was 71,612 taels, the expenditure 68,668 taels, or a little over

27 taels per student. At this time the North China Provincial College for Women (Pei Yang Kao Teng Nu Hsueh Tang), located in Tientsin, had 7 teachers and 74 students. The subjects taught were Chinese classics, history, wenli composition, geography, domestic science, mathematics, English, painting, sewing, Chinese penmanship, music, and calisthenics. The annual income for the college was 9,831 taels and the annual expenditure 9,586 taels. The North China Broad Knowledge Woman's School (Pei Yang Hung Wen Nu Hsueh Tang) had 10 teachers and 82 pupils. In addition to the subjects taught in the above-mentioned college were physics and the use of the sewing machine. Its income was 2,158 taels and its expenses were 8,640 taels for the year. The North China Woman's Normal School, with a four-year course of study, is also located in Tientsin, and had, in 1908, 9 teachers and 84 students, having graduated 78. The Japanese language was taught in place of English. The annual expense for the year had been 24,203 taels, and its income but 23,387 taels. In 1909, when I visited this normal college, there were 13 teachers, 6 men and 5 women and 2 student teachers. The enrollment was 98. I was told that more than half of these students were good Chinese scholars. I visited classes in botany, drawing, music, and algebra, all of which were well conducted. The students were dignified, making a good impression and giving every promise of developing into good teachers. At that time I also visited the Woman's Nurses' Training School in Tientsin. Dr. Yamei Kin, an exceedingly well-informed Chinese lady, and a graduate of the Woman's Medical College of New York, is the director of the school. Dr. Kin had personally superintended the remodeling of the buildings used for the school, and had shown excellent judgment in all the arrangements. A class of 23 pupils was pursuing a two-year course of study. Later on Dr. Kin hopes to open a woman's medical college in connection with the nurses' school. Most of the remaining schools in Chihli Province were primary, enrolling from 7 to 156 students. The subjects taught were similar to those given above, only of a more elementary character.

Provision was made in July, 1908, for a woman's normal college to be opened in Peking in two temples outside of the Hsi An gate. Appropriations for 50,000 taels for repairs and 30,000 taels for annual expenses were provided by the Government. Women between the ages of 20 and 30 are to be admitted after passing the required entrance examinations. All the teachers are to be women, with the exception of the director and the teachers of Chinese subjects, who must be over 50 years of age. The future success of girls' schools is assured, for the Regent is known to take much interest in the establishing of schools for girls, and has several times urged upon the ministry of education the importance of seeing that these schools

were rapidly established in the Provinces. He desires that all the regulations concerning girls' schools should be carried out, except the one in regard to the employing of men above 50 years of age as teachers in girls' schools. Since there is an insufficient number of qualified men of that age to man the schools, the Regent feels that there should be no delay in the establishment of these schools, and that the need of good teachers justifies the employing of younger men. In 1908 there were reported to be 771 girls attending the primary schools in Peking. Doubtless by to-day the attendance has been more than doubled.

The establishment of girls' schools is sure to revolutionize the home and social life of the people. The Government has refused to admit girls with bound feet into the schools, and this will be the most effective weapon that can be used to blot out that pernicious custom. It is sure to open the way for women to be self-supporting. Tuan Fang, in advocating female education, pointed out that in time the women would be able to teach the primary schools. The graduates of the mission girls' high schools have proved themselves excellent instructors, and the educated women will be preferred to men as teachers of the young children. The Chinese western-educated young men have a desire to see their sisters educated, and all Chinese educated women are the recipients of their chivalrous attention, as was demonstrated last summer when the Chinese young men studying in the United States invited all the Chinese women students to be their guests at their summer conference held at Hamilton, N. Y. The young ladies accepted their invitation and, properly chaperoned, attended. The courtesy of the young men extended even to the payment of their traveling expenses. The western-educated young man wants an educated wife, a companion, not a slave, and those who are married to uneducated, superstitious women feel that their lot is "bitter," but must be endured. A graduate of a Christian college, in speaking of his uneducated heathen wife, said: "She is like a carbuncle on my neck." She was largely what the old educational and social system had made her. The fault was not hers, but that of the system. In time the education of women is sure to destroy the present system of early marriage. It will liberate women and do away with concubinage. It will give the educated woman a different position in the home of her mother-in-law, and will be the greatest means that can be employed to do away with superstitions. The future educated mother in China will be to her husband, home, and children all that we find in her educated sisters of other countries.

CHAPTER VIII.

CHINESE STUDENTS STUDYING ABROAD.

Never in the history of the world has any other country sent so many students to study abroad as has China since entering upon her educational reforms. In the very beginning of the movement the Government was forced to recognize the fact that China was wholly unprepared to meet the demand, for she lacked men prepared to take up the work of the construction and execution of a policy to be built on the ruins of the old educational system. She recognized that her vast army of scholars, who had been trained in the old and were ignorant of the new learning, would prove a menace to reform unless they could be trained in western learning and induced to serve in the organization of a work that they themselves would be unable to carry out to completion. It was a master stroke on the part of China that she held out such great inducements to her literati to foreign study and travel. That Japan was chosen for a field of study, and especially for short courses in training, was due to her proximity as well as to her similarity in customs and the written language—an economy in both time and expense. The experiment has not been entirely satisfactory, although her main object has been accomplished, and to-day the new educational system, though imperfect as yet in detail, is firmly established.

In September, 1901, the Government, as we have seen, commanded the viceroys and governors to send students abroad for study, and required that their expenses should be met by their native Provinces. Each Government student now receives 120 taels for traveling expenses, and 400 taels aid per year while in Japan studying. The Imperial Government, following the advice of Yuan Shih Kai, sent many Hanlin and chin shihs abroad for study or travel, and in this way these men also were brought in line with the new system. Special competitive examinations were held for those who held rank above the first but had not obtained the second degree, and the best of these men were made expectant officials. Those having failed realized that they had been given a chance and had lost, and now they were content to fall in line and enter such positions as were open to them. Thus was a great revolution in education brought about with little or no opposition. "Early in 1902 there were 271 Chinese students, from 15 Provinces, studying in the Sunrise King-

dom.”¹ In 1903 there were 591, and during the year 1904 they increased at the rate of 100 per month, until in January, 1905, there were 2,406, and by November of that year the number had increased to 8,620.² In the autumn of 1906 the Japan Mail gave the number as not less than 13,000, and in the spring of 1907 the Chinese ambassador estimated that there were 15,000 students in Tokyo,³ while later according to His Excellency Wu Ting Fang, there were at one time studying in Tokyo as many as 17,000 Chinese students.⁴ Although the experiment was not entirely satisfactory, the fault was not all on the part of Japan. A great majority of the students sent by the Provinces and others, supported by city or village guilds, or by friends or parents, were in no sense prepared for study in the Japanese schools. Most of them had no knowledge of the Japanese language, and had first to devote months to the study of it before being able to enter the public schools. Many were there for short-term courses of a year or less, while others came because it was popular to do so. Some came for political reasons, while others, too old to learn a language, on finding the work difficult, became discouraged and returned home. Again the Japanese Government schools were wholly unprepared to accommodate such an invasion of students. Private schools were opened especially for Chinese students, and often by incompetent and unscrupulous Japanese, who, caring only for the Chinese silver, offered “short-cut courses,” and sold diplomas to dishonest students. These, on their return to China, were able for a short time to impose upon the ignorance of their countrymen, and so brought Japanese education into general disrepute. Too much veneer and too much political agitation soon brought the movement into disfavor. The Peking Government applied a restraining hand by requiring all Government students who wished to go abroad for study to pass an examination upon all the subjects required in the middle schools⁵ before leaving China, and in August, 1908, required that students should have a sufficient knowledge of the language of the country where they intended to study to be able to attend and understand the lectures; and, as students still disregarded this action, an edict of December, 1908, gave warning that any returned students whose examination papers had not been filed with the ministry of education before going abroad for study would not be admitted to the imperial examinations for returned students.⁶ In September, 1908, the Government announced that all returned students from Japan, before being admitted to the im-

¹ The Educational Conquest in the Far East, p. 184.

² North China Herald, Mar. 16, 1906, p. 569.

³ The Chinese Students' Migration to Tokyo, p. 4.

⁴ The World's Chinese Students' Journal, vol. 3, No. 1, p. 11.

⁵ Hsueh Pu Kuan Pao, vol. 4, dept. 2, p. 59.

⁶ *Ibid.*, vol. 78, dept. 3, p. 2.

perial examinations, must first pass an examination before the ministry of education on general subjects, including Japanese classics and language. The reason given was that many students had secured diplomas from Japanese scientific schools very easily.¹

Many returned students from Japan have miserably failed in the imperial examinations at Peking. In the report of the examination held October, 1908, appears this statement: "Twenty were rejected as failures; youths who had studied in Japan." Not only is rigid oversight of the students inaugurated at Peking, but the strictest of measures are being enforced by Chinese officials in Tokyo. The result is that unprepared pupils are not going to Japan as formerly, and all the short-term schools have been discontinued. The Government schools and the large private schools, like Waseda University, now refuse to admit students unless they enroll for a specified number of years. All this has resulted in reducing the number of Chinese students. In 1909 there were in Tokyo 1,992 Chinese Government students in the collegiate schools and 395 in the military schools, making a total of 2,387 Government students in that city. There were also at least 2,500 private students. It is estimated that not less than 5,000 Chinese students, 150 of whom are women, are now studying in Japan. Though their numbers have been greatly decreased, the quality and moral standing of the students have materially increased. Both the Government and private students now in Japan are there for earnest effort, and with the intention of completing prescribed courses of study; they are doing their work well and many in the higher courses are winning honors among the Japanese students. They represent the better element of China, having been selected by competitive examinations or because of their social standing. The revolutionary class, at one time so strong, has largely disappeared. Rev. P. J. Laird, in the *Chinese Students in Japan*, says: "Although drinking and drunkenness are far more prevalent among the Japanese than one had imagined before coming to live in Tokyo, one has not yet seen a Chinese intoxicated."² There is no likelihood that the Chinese Government will decrease its number of scholarship students for some years to come. The Imperial Government, beginning with 1909, proposes to send 200 new students to Japan each year for the next five years.³ By imperial decree of January 3, 1909, Government aid was to be granted in future, especially to students who were actually taking technical or medical courses in the higher institutions of Japan, as the Government is in need of their services.⁴ The students in Japan are able to advance in Chinese learning, which

¹ Hsueh Pu Kuan Pao, vol. 65, dept. 1, p. 3.

² The Chinese Recorder, January, 1907, p. 61.

³ North China Herald, July 31, 1909, p. 281.

⁴ Hsueh Pu Kuan Pao, vol. 77, dept. 2, p. 4.

gives them some advantages in the imperial competitive examinations at Peking over students having studied in other countries. In the examination of returned military students in 1908, of the 68 competing students 12 had studied in Germany and 56 in Japan. The examination resulted in 27 being graded "first class," 26 from Japan and 1 from Germany; the remaining 41 candidates were graded "second class." The failure of the students from Germany to make "first class" was due to their poor preparation in Chinese. There is a general feeling among the Chinese students that to study in Japan is to receive a knowledge of the western sciences and literature second-hand, and that it is far better to obtain it first-hand in America or Europe. Many of the students now studying in Japan hope later to take graduate work in some western country. The tendency of the Chinese Government has been each year to send more and more students to the Occident.

The rigid enforcement of the Chinese exclusion laws prevented, in the beginning, many Chinese students coming to America, and sent them to Japan or Europe. This was due not so much to the existence of the law, as that in some cases it was unjustly interpreted by the United States Government officials at San Francisco; but more often it was due to carelessness or ignorance in making out credentials. Chinese officials often signed passports who, according to the treaty, were authorized to do so—His Excellency Li Hung Chang being no exception—and students were at times held up or sent back because passports were not legally made out. We have never heard that a Chinese student who presented a properly made-out and witnessed passport had been denied admission to the United States. But there are connected with it most humiliating conditions that can not but offend a Chinese student, and this lack of courtesy and justice creates resentment against the United States.

The fixed allowance given by the Chinese Government to students studying in universities and schools in western countries is as follows: England, £192 per year; France, 4,800 francs; Germany, 3,840 marks; Russia, 1,620 rubles; Belgium, 4,800 francs; United States, \$960. Those pursuing studies in preparatory schools receive one-fifth less than that given above.¹ Traveling expenses are always allowed, and sometimes additional money for an outfit, as in the case of the Chinese indemnity students.

In 1900 there were but a few Chinese students in England. Later, and especially after 1905, larger numbers began to arrive, many at their own expense, while others held provincial or Government scholarships. Among the latter were students sent from Nan Yang College, the Imperial University, College of Languages, Hupei Iron

¹ Hsueh Pu Kuan Pao, vol. 9, dept. 5, p. 10.

Works, Kiang Su, Sze Chuan, and Kuang Tung educational bureaus, and Shanghai Polytechnic College, until in 1907 there were about 60 students. These students were attending the Universities of Oxford, Cambridge, London, Manchester, Liverpool, and Birmingham, also some of the Scotch universities, while others were studying the iron and steel industries at Sheffield or were in attendance at the principal technical and commercial schools, Navigation Training College, and the Royal School of Mines in the United Kingdom.

April 11, 1910, the following information was sent from the office of the educational commissioner of Europe: There are to-day some 140 Chinese Government scholarship students, and about an equal number of students supported by private funds in the United Kingdom. In Belgium there are about 70 Government students; in France, 80; in Germany, 60; in Austria, 10; and in Russia, about 15. No statistics could be sent regarding the private students in these countries, as they are not under the direction of the commissioner. "In all these countries the subjects that are generally studied are: (1) Engineering, which includes mining, civil, electrical, and mechanical; (2) law (LL. B. as well as the barrister-at-law); (3) science, pure and applied; (4) arts; (5) economics, banking and commerce; (6) miscellaneous, such as agriculture, textile manufacturing, architecture and shipbuilding, military and naval subjects, gunnery, and gun-making." There are also about 30 naval students in England, 30 military students in Germany, 10 in Austria, 8 in France, and 3 in Belgium. There are many private students on the Continent, among them a son of Prince Su, who is in Belgium.

The universities of no western country are attracting so many Chinese students as are those of the United States. The reasons are, first, that of all the foreign languages the English is the most familiar to the Chinese student; second, because of the democratic spirit of the American universities; and, third, because of the cordial reception now tendered Chinese students by the American Government and people. In 1905 there were 51 students in the American universities and 19 graduate students.¹ At that time there were enrolled in the University of California 17; in Columbia University, 6; in Cornell University, 5; in Massachusetts Institute of Technology, 5; and in Yale University, 4. The next year 217 students were reported as studying in the United States; of this number 122 were attending universities, colleges, or technical schools;² 62 were in high schools and 33 were unclassified. There were 13 female students. One hundred and eighteen of the students in the universities, colleges, and technical schools were pursuing the following courses of study: Philosophy, 1; education, 6; political science, 9; law, 6; economics,

¹ Admission of Chinese Students to American Colleges, p. 180.

² Mei Chou Liu Hsueh Pao Kao, p. 36.

including public finance, commerce and commercial law, 14; arts and sciences, 3; physics and mathematics, 2; chemistry, 4; medicine, 3; railway and sanitary engineering, 21; mechanical engineering, 5; electrical engineering, 8; mining engineering, 13; agriculture, 10; forestry, 1; textile manufacture, 10; and military science (West Point), 2.¹ The universities having the largest attendance were: Cornell, 17; Harvard, 16; California, 14; Yale, 10; Columbia, 6; Brown, Chicago, and Pennsylvania, 5 each.²

In the summer of 1907 Viceroy Tuan Fang, desiring to send some students to the United States, held at Nanking the first Government competitive examination for the selection of students to go abroad. The examination was unique, as it was the first to be opened to women. Out of 600 students who made application only 72 young men and 10 young women were deemed qualified to enter the examination. After a three-days' test, 10 male and 3 female students were chosen, all of whom were well qualified to do university work. One was admitted to the junior class in Cornell University. The following year a similar examination was held at Che Kiang. Of the 200 candidates, about 25 were disqualified physically. The examination was based upon the system of entrance examinations of Yale and Harvard. The examiners were Mr. Chao Sze Bok, M. A., LL. M. (Yale); Mr. Leo, a returned student from Belgium, who conducted the examination in French; Mr. T. H. Lee, B. A. (Yale); and Mr. Pu, B. Sc. (California). Of the 20 students chosen, 3 were from St. John's University, 10 from the Imperial Polytechnic, 3 from Ching Tan College (Shanghai), 1 from Tientsin University, and 3 from other institutions. Out of gratitude for the return to China on the part of the United States of over \$10,000,000 gold of the Boxer indemnity, China pledged herself to send to the United States 100 students each year for 4 years, and 50 students annually thereafter for 28 years, in all 1,800 students. One-half of these annual detachments are to be of advanced grade, who, upon their arrival in the United States, will be able to enter some college or technical school; the other half are to be under 15 years of age and to possess a good knowledge of Chinese and some knowledge of English and western studies. The Indemnity Scholarship Preparatory School is to admit 300 students, composed of 100 of the higher grade, all of whom are to be under 20 years of age and must possess a good knowledge of the Chinese classics and literature, and 200 of the lower grade. The advanced students are to be chosen by competitive examination without regard to Province, race, or religion; Chinese, Manchus, Chinese Bannermen, Monguls, and Thibetans are all equally eligible, the conditions being to pass the

¹ Mei Chou Liu Hsueh Pao Kao, p. 66.

² *Ibid.* pp. 1-36.

examinations. The lower-grade students are to be chosen from the Provinces, each Province to be represented in the preparatory school by the number allowed according to the proportion of Boxer indemnity it has to pay, but this does not insure each Province of its quota being sent to the United States, as the students are to be chosen from the school by competitive examination, which means that students from some Provinces may stand higher in the examination than those from other Provinces. In September, 1909, the Government selected, by competitive examinations held at Peking, the first class of indemnity students to be sent to the United States. Out of about 600 applicants, 47 students were chosen, but they arrived in the United States too late to enter college classes. The students, with the exception of 2, were placed in eastern academies for the remainder of the year, when they will all enter college classes.

In January, 1910, there were not less than 600 Chinese students studying in the United States. According to statistics given by the Chinese Students' Monthly, of March, 1910, there are 462 students located east of the Rockies, distributed in institutions as follows: Universities, 244; colleges, 28; professional institutions, 29; seminaries, 21; academies, 63; schools, 50; grammar schools, 2; and unclassified, 28.¹ The universities enrolling the largest number of students are: Cornell, 35; Harvard, 26; Columbia, 23; Wisconsin, 22; Yale, 22; Illinois, 20; and Pennsylvania, 19.¹ According to the distribution by States, there are in Massachusetts 124 Chinese students; New York, 89; Illinois, 65; Pennsylvania, 41; Connecticut, 30; Ohio, 24; Wisconsin, 23; Indiana, 19; and Michigan, 15.² The 4 Provinces sending the largest number of students to the United States are Kuangtung, Kiangsu, Chekiang, and Chihli.

The first imperial metropolitan examination for returned students was held in Peking in 1905, under the direction of the board of rites. The examination not being well advertised, only 14 candidates appeared, all from Japan. Degrees were conferred upon all, 2 receiving the Hanlin, 6 the chin shih, and 6 the chu jen. Since then the examinations have been conducted each year by the ministry of education. The first was held in October, 1906. Graduates of schools not below the grade of the Japanese high school were eligible, but candidates were required to present their diplomas, notebooks, and such published works as they might have. There were 42 candidates, ranging from 44 to 23 years of age; 23 were from Japan, 16 from the United States, 2 from England, and 1 from Germany. The board of examination was composed of Chinese who had studied abroad, and were representatives of the schools of England, France, Russia, Germany, Japan, and the United States.

¹ P. 269.² P. 268.

The following is a quotation from an article in the Chinese Recorder by Prof. W. W. Yen, who ranked second in the examination: "The examination was divided into two parts, occupying two whole days, the 27th and the 29th of the eighth moon. On the first day the candidates were examined in the subjects they specialized in while at college. Each candidate was handed an envelope containing the questions, of which there were three in each subject; he was required, however, to reply to two only. Permission was granted to the men to write in any language they preferred, and nearly all the returned students from Europe and America employed English as their vehicle of expression. To enable the reader to form some idea of the themes put forward by the examiners, the three proffered to the candidate in philosophy are here presented: (1) Define philosophy and distinguish it from science and ethics. Explain the following systems of philosophical thought: Dualism, theism, idealism, materialism, pantheism, agnosticism. How would you classify, according to the western method, the following Chinese philosophers: Chuang Tzu, Chang Tsai, Chu Tzu, Lu Tzu, and Wang Yang-ming? (2) Explain why philosophy developed earliest in Greece. What are the leading thoughts in the teaching of Heraclitus? Why will his system, at one time almost obsolete, again become popular? (3) Expound fully Mill's four methods of induction and mention some of the scientific discoveries and inventions which may be directly traced to them. At the examination on the second day, which was aimed at testing the general knowledge of the men, the same two subjects for an essay were given out for all the candidates, one for those desiring to compose a Chinese essay and the other for the returned students from western countries. The former was typically Chinese, and may be roughly transliterated as 'To respect those in authority, to love one's kin, to venerate one's elders, and to segregate the sexes; these are principles that will abide for all generations'; the latter was a theme for argumentation, and was worded, 'Will it be expedient for China to adopt a system of compulsory education?' All the candidates, since they came from so many countries and represented so many institutions, were placed on the same level and had to be graded (1) according to their foreign degrees, (2) according to their achievements since their day of graduation, and (3) according to the quality of the papers submitted to the examiners. All those attaining over 80 out of a possible 100 marks were to receive the degree of chin shih; over 70, a first-class chu jen, over 60 a second-class chu jen, while those who received over 50 got only a certificate stating that the holder had attended the board examination. Ten out of the 42 men failed even to make 50 points, and were requested to try again next year."¹

¹ The Recent Imperial Metropolitan Examinations, January, 1907, pp. 34-39.

The examination resulted in conferring the chin shih degree on 9 candidates, all of whom, with the exception of 1, a graduate of Trinity College, Cambridge University, were graduates of American institutions. In the second class 5 were granted the chu jen degree; the first 3 were from America, the last 2 from Japan. In the third class 18 received the second-class chu jen degree; the graduate of Berlin University ranked eighth in this class, and the 1 from London University occupied fifth place.

Those who received degrees at these Metropolitan examinations must have added to the degree the special subject in which they are examined, as fa ke chin shih (doctor of law), nung ke chin shih (doctor of agriculture), or kung ke chu jen (master of civil engineering). In this first examination a graduate of an American dental college was given the chin shih degree. One candidate could scarcely write his name in Chinese, but by using a foreign language in the examination, secured his degree. The next year, 1907, the examinations were more rigid. Essays written in Chinese were required, and the diplomas, instead of being on the same basis, were graded as follows: Doctor of philosophy degree credited with 100 points; master of arts, with 90 points; bachelor of arts, with 80 points; professional and technical degrees were given fourth place and but 70 points; while a high-school diploma from Japan was granted 60 points. This schedule has not in all cases worked satisfactorily, yet it is influencing many students to take a Ph. D. degree in connection with their professional or technical degree, who would not otherwise do so. At this second examination 7 received the chin shih degree, 17 the chu jen degree, and 14 the second-class chu jen degree. At the examination held in 1908 there were 15 graded first class, 45 second class, and 47 third class, making a total of 107 to receive degrees. At the last regular examination, 1909, 30 passed first class, 57 second class, and 15 third class, 102 securing degrees.¹ At a special examination for a list of officials who had studied abroad the chin shih degree was conferred upon 12 and the chu jen degree upon 7.² Some of these successful chin shih were members of the first board of examiners under the ministry of education. All government scholarship students are expected to take these examinations upon their return to China and to serve the Government a limited number of years. These examinations are being carefully conducted and are becoming more rigid each year. According to the memorial published in the Hsueh Pu Kuan Pao,³ students of medicine, engineering, physics, and agriculture who are graduates of colleges and students who are graduates of high schools (Japanese) may be excused from

¹ North China Herald, June 5, 1909, p. 535.

² North China Herald, Jan. 21, 1910, p. 144.

³ Vol. 46, pp. 62-64.

writing the Chinese essay at the examinations; but it further provides that students who are excellent in Chinese as well as in science shall be classed as first grade; those who are good in science and fair in Chinese shall be classed second grade; and those who are very good in science and poor in Chinese shall be classed in the third grade. It also emphasizes the fact that students shall be strictly graded according to their standing; that it is not necessary "to squeeze" students into the first grade; that the first or second grades may be left vacant if there are no students passing high enough for those grades; and should all deserve first grade, then they must be ranked in that grade. This, of course, is a direct innovation on the old system of examinations which allowed a certain number of degrees at each examination. After this examination, held by the ministry of education and the examiners appointed by the throne, these successful candidates are later received in imperial audience and undergo another examination, after which official rewards are conferred upon the students according to the result of the two examinations. The chin shih who stand first in the palace examination are given the title of Hanlin, pien hsiu, or chien tao; the second are rewarded with shu chi shih of the Hanlin Yuan, and three years later, upon the recommendation of the president of the Hanlin Yuan, may be rewarded with pien hsiu or chien tao; those who stand in the third class of the chin shih and the first class of the chu jen are rewarded with chu shih and given offices in the different ministries according to their special line of study. Those chu jen who stood in the first class in the examination held by the ministry of education, but fell in the third class at the palace examination, are rewarded with chih hsien and given districts to govern at once. Those in the second class of chu jen and rank second class at the palace examination are rewarded with small posts of the seventh grade in Peking and are given positions in the different ministries or boards; those who stand in the third class at the palace examination are given the title of chih hsien, or district magistrate.

A half century has past since China began her struggle with modern education. At first, forced upon her as it was, she regarded it with contempt, her greatest literati doing everything possible to prevent its getting a stronghold in the Empire. They not only despised the western barbarian, but placed little confidence in the Chinese who condescended to use him as their teacher, and as far as possible kept them out of official employment. But there were men of vision, like Tseng Kuo Fan, who saw that there must be readjustments in Chinese education in order to have men prepared for China's future needs. Up to 1900 the presidents of the Hanlin Yuan were bitter opponents of western education; since that time they have been strong advocates in its favor. We have seen how little the Tung

Wen College and its annexes were able to accomplish because of the bitter antagonism outside; how Li Hung Chang, as successor of Tseng Kuo Fan, failed in courage to brook the opposition to the first student mission to the United States, and allowed those promising students to be returned to China before completing their courses of study, and to suffer so many indignities upon their arrival home. The sight of American war vessels in Japanese ports caused Japan to appreciate the necessity of immediate reform, and she set out at once to make herself great by learning all she could of the arts and sciences of the west; but it took the artillery of the world to awaken China to the keen appreciation of her danger and the necessity of educational reforms if she were still to maintain her sovereignty. It was not until after the allied armies had relieved the besieged legations in Peking that the Empress Dowager, in her flight for safety, realized that the "Boy Emperor" had been in the right in attempting to make his country great by the introduction of western learning. Convinced, then, of the need of instituting reforms, that woman of indomitable will stayed not her hand until she had given the death blow to the wen chang and had annihilated the old competitive examinations and established a system of Government schools that should be free to poor and rich, male and female, alike. This educational reform was the conception of her nephew Emperor, but she it was who possessed the power to carry to completion the greatest revolution in education that the world has ever witnessed. She lived to see it firmly established and to know that the greatest of her people approved the establishment of an educational system that would make possible the carrying out of her promise that the nation should have a constitution, provincial assemblies, and a national parliament.

There are many defects in the educational system. The attempt to make a combined course of study that would contain all the classical learning of the old literati, and all the arts and sciences of the west, has proved a failure, but it can and will be remedied and suitable courses will be worked out to meet the special needs of the Chinese people. The requiring of too many hours of recitation work, and the leaving of too little or no time for study, have failed to produce the desired results. Time will overcome the lack of competent administrators and trained teachers. The lack of funds to meet the future demand of the schools will be the problem that the provincial assemblies and national parliament must solve. There has developed in the new system a lack of that reverence for the teacher that characterized the old system. The goggle-eyed, stoop-shouldered, subservient student of the past is no longer to be seen. In his place has come the bright-eyed, military-trained lad, who loves athletic sports, is intensely patriotic, and is impatient for the day when he shall be prepared to aid in the regeneration of his nation.

Such lads are no longer content to be taught by antiquated teachers. The new and the old are out of harmony.

We must not forget that the system has been in operation only 8 years, and under the control of the ministry of education less than 5. What China has accomplished in modern education during this time is marvelous. Note the number and variety of the schools established, the aid her people have given by private gifts, their enthusiasm for the system, and the thousands of students that have migrated to foreign lands in search of western learning. Never has a country accomplished more in so short a time after the establishment of a new system of education. Great opportunities await these returned students. Their country needs their services, not only in the construction of the many railways, the opening of mines, the establishment of industries, the conducting of great commercial enterprises, the providing of an adequate national defense on land and sea, the drafting of laws and the preparation of a national constitution, but to them, more than to any others, belongs the duty of solving the problems that yet confront the educational system of China. The men of the old régime, like Chang Chih Tung, Sun Chia Nai, Yuan Shih Kai, and Tuan Fang, came nobly to the front and, in the face of many difficulties, aided in the establishment of the present educational system. It now becomes the duty of the chosen men who have been given every opportunity that money and western culture can offer to revise the courses of study and develop this national system of education, and we have faith to believe that they will accomplish the task and that the Chinese people shall yet contribute largely to modern thought and culture.

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MATHEMATICS IN THE PUBLIC AND
PRIVATE SECONDARY SCHOOLS
OF THE UNITED STATES

INTERNATIONAL COMMISSION ON THE TEACHING
OF MATHEMATICS

THE AMERICAN REPORT

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 E. J. Owen, Pillsbury Academy, Owatonna, Minn.
 Laura A. Whyte, Miss Porter's School, Farmington, Conn.

APPENDIX.

The following reports relate to institutions which, though not secondary schools exclusively, cover more or less of the secondary field in their work:

a. Report on Mathematics in Evening Technical Schools.

By A. D. Dean, State Education Department, Albany, N. Y.

b. Report on Private Correspondence Schools.

By W. F. Rocheleau, Interstate School of Correspondence, Chicago, Ill.

c. Report on Mathematics in Schools and Colleges for Negroes.

W. T. B. Williams, Hampton Institute, Hampton, Va.

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MATHEMATICS IN THE PUBLIC AND PRIVATE SECONDARY SCHOOLS OF THE UNITED STATES.

COMMITTEE NO. III. PUBLIC GENERAL SECONDARY SCHOOLS.

I. GENERAL REPORT.

ORGANIZATION.

The pupils.—The public secondary schools of the United States, usually called high schools, receive pupils that have completed an elementary school course, generally of eight years. The age of pupils beginning high-school work is about 14 years.

The studies of the elementary school include arithmetic, geography, history, English grammar, literature and composition in English, with other studies that vary according to the location of the schools and with the resources of the communities that support them. These studies do not include foreign languages, except in very rare instances, and only occasionally include rudimentary study of algebra,¹ the construction or measurement of geometrical drawings or models, or the study of geometrical facts beyond a few rules for mensuration of simple plane figures and the very simplest solids. The algorithm for square root is often taught, but that for cube root seldom. The greatest emphasis and the longest practice are put upon commercial applications of arithmetic.

The purpose of the high school.—The purpose of high-school education has generally been twofold—not only to furnish preparation for college, but also to provide some of the elements of a liberal education for those whose formal and directed study is to go no further. In not a few communities high schools were established in which the former purpose was expressly waived; but even in these schools the gradual broadening of college entrance requirements has combined with the pressure of able and ambitious pupils to establish college preparation as a recognized purpose of high-school work. More recently a new type of high schools has been devised, to furnish preparation as direct as possible for certain special vocations, notably those of the machinist and the merchant. These will be dealt with in another report. This report is confined to high schools of the general type.

¹ The word "algebra" in this report includes all arithmetic in which letters are used to represent numbers.

The length of the course.—The high-school course is generally one of four years. The work is usually done in a separate building from the elementary school, by more highly paid teachers. In thinly settled and poor communities the work is frequently done in the same building as the elementary school, and even by teachers who must give part of their time to the care and teaching of the younger grades. In such cases the period of high-school work is shortened sometimes to two or even to one year, and obviously can serve only for the beginning of college preparation, if for any; the pupil must go to some more central institution to complete the high-school work.

Until within a few years the high-school diploma in the city of Boston was given for three years' work, a postgraduate year being necessary for the usual college preparation. At present this is no longer true in large centers.

In a very few cases the work of the high school has been carried into subjects usually reserved for college; this, however, can not be said to present a tendency of actual development to-day.

The six-year high school.—The last few years, however, have seen a decided pressure for the extension of high-school work downward into the two upper grades of the elementary school. The six-year high school thus constituted had its most telling argument doubtless from the language teaching, in earlier utilization of the imitative faculty; it presents, however, great advantages for mathematics, especially in the possibility of closer correlation of arithmetic and algebra and in the introduction of intuitional geometry at an appropriate age.

As this proposition has been detailed for consideration in the city of New York, the six-year high school would be divided into separately organized parts, so that the complete school career of a pupil would consist of six years in the elementary school, three years in the lower high school, and three years in the upper high school. In some other places it has taken the form of departmental organization of the last two years of the elementary school under the direction of the high-school department heads. In five high schools, which include the two oldest schools in America and a school in one of the youngest States in the Union, pupils are admitted at the end of their sixth school year and the six years' work is organized as one whole.

A separate report on six-year high schools has been prepared by a subcommittee under the chairmanship of Prof. A. S. Gale.

Supervision.—In about a dozen States of this country there is no supervision of high schools exercised throughout the State, either by the government or by any university. In these States the high schools are under the direction of the local school board and its executive officer, the superintendent. The results are not chaotic, in spite of the lack of centralization; for the superintendents and the

teachers under them confer with their fellows elsewhere and follow the lead of universities, though not officially related to them, and of such associations as the National Education Association and their several committees.

Even in the States where the high-school course of study is prescribed by the government or by the State university some latitude is generally left within which the local authorities can modify the work, especially for pupils not destined for the university.

The elective system.—In some high schools the pupils are permitted to choose, with the consent of their parents and under the advice of their teachers, not only the general aim of their work but the separate courses of instruction that seem to contribute to that aim, just as a graduate student does in a university. A diploma is then given for the completion of a certain number of units of work—generally not less than the equivalent of 20 courses, each consisting of 4 hours class instruction per week for 1 year.

Election by courses.—In most high schools, however, an attempt is made to provide for varying aims of study by organizing groups of studies, with descriptive titles, such as “The classical course,” “The English course,” “The commercial course,” and so on. The State of Maine officially recognizes seven such courses in the regular high schools, besides providing for agricultural high schools as separate institutions.

State regulation.—Such regulation as that just mentioned is based upon State aid to the schools, or upon the admission of their graduates to State normal schools or State universities. Communities receive grants of money from the State treasury on condition that certain conditions of equipment are met and that the courses of study suggested by the State authorities are efficiently maintained. In certain cases State university officials inspect the schools to see that the instruction is of satisfactory quality.

In many States this dictation and supervision is confined to careful definition of the subjects of study and of the time that may be allotted to them, leaving the grouping into “courses” to be done by the local authorities. This is in line with the plans now in vogue for defining requirements for admission to college—in which many more subjects are provided for than any one student can possibly think it wise to take, so that individual preferences and aptitudes can be accommodated, and the total achievement estimated by a uniform though somewhat artificial standard of replaceable educational values. Among studies which all pupils are expected to include in their work are, generally, English language and literature, history, and 2 years of mathematics, including plane geometry and algebra.

The minimum requirement.—Where the State authorities define in detail the various “courses” of study among which the pupil

may choose, algebra and plane geometry generally appear in all such courses. This is the case even in such specialized courses as those labeled "agricultural" or "commercial," but Maine excepts the "household arts course," in which there is only a year of "mathematics" not otherwise described.

Throughout the country there is an apparent minimum of over 3 years of mathematics required;¹ this includes, however, a year or so that might properly be classed as elementary school work, being arithmetic drill of a purely mechanical type, studied solely for the sake of its commercial applications.

The principal.—The principal or executive head of a high school gives his whole time to administrative duties in the largest schools. As we pass to smaller and smaller schools we find that the principal must devote more and more of his time to teaching, until in small towns the high-school principal has only a short time each day for the duties peculiar to his position. More time is often secured for them by making him also superintendent of schools, or by combining all the schools into one institution with kindergarten, elementary, and high-school departments.

In the absence of general laws regulating the high-school studies throughout the State, the principal of a small school has great influence in changing the character and extent of the work done, sometimes even to the extent of completely changing the aims and fortunes of the school. An energetic man in this position can always materially affect the methods of teaching and the details of the material covered, if the subject is one upon which his opinion is definitely formed.

The head of the department of mathematics.—Where two or more are teaching mathematics in one school, the custom is growing of having one teacher designated as head of the department. Sometimes he is selected by the principal, more often by the superintendent of schools or by the school board. His duties include a more or less definite responsibility for the work in mathematics throughout the school, especially with a view to the coordination of parallel courses; he conducts department meetings, confers with the principal, informs himself as to textbooks and teachers available for future work. His advice or direction is sometimes effective upon the topics of instruction, generally effective upon the methods.

Cooperation.—The body of teachers, in a high school separately organized (i. e., not in the same building with the elementary school or not having the superintendent of schools as principal), has little or no influence upon the teaching of mathematics in the elementary school. A considerable influence, on the other hand, is exerted upon high-school mathematics by the existence of college entrance

¹ Mr. E. E. Whitford, in *School Science and Mathematics*, April, 1910.

standards. Within a few years an additional influence has been the organization of associations of secondary school teachers of mathematics and of kindred subjects, in which college instructors have participated. Less than half of the high schools of the country are represented in these associations, and their effect seems rather to have been the awakening of interest on the part of the teachers than actual reform on the part either of subject matter or of method.

The teachers.—The best of the high-school teachers of mathematics, with rare exceptions, have no more knowledge of mathematics than would be indicated by a 1 year's course in the calculus. The great majority of them have not even that. Standards are, however, improving, the principal obstacle being ignorance and indifference on the part of educational authorities. This obstacle is more obvious in States where there is no State university at the head of the educational system, or where there is no State-wide organization of education. The city superintendent of schools is generally more an organizer than a scholar, and represents the demand for elementary education rather than for secondary, for practical education rather than for college preparation; and thus far mathematics in high schools continues to point its signboards toward the university. As a whole, then, the result is a lack of emphasis on preparation of teachers of mathematics. In the smaller high schools it is not uncommon to find the bright young girl who was studying solid geometry last year teaching algebra or geometry this.

Racial restriction.—Throughout the South negroes are excluded from the high schools where white pupils are taught. In certain localities separate high schools are provided for the negroes; work done in them is, with very few exceptions, of a distinctly inferior character.

Promotions.—In about 75 per cent of the high schools promotions are annual, in the rest semiannual. In the South and in the smaller schools promotion is more often by class; elsewhere by subject.

THE CURRICULUM.

Directive influences.—The curriculum in mathematics is determined in general by the admission requirements of colleges. This is, of course, confessedly so in the States in which there is a complete and State-wide organization of education, with the university recognized as the final stage. It is also true in other States, and even in the smaller communities where few, if any, of the pupils may be planning to go to college, and where the local school committee disclaim the intention of following university guidance; and it is true of the mathematical curriculum even where it is not true of other subjects of study. The reason for this nearly universal dependence on college definitions

is that mathematics is not otherwise defined by any authority that the schools feel willing to accept.

The definite and legal enactment of all public high-school courses of study is in all cases made by the school committee (often called the school board, or the trustees). Only occasionally does this body contain members able or willing to decide upon details of a subject that seems to the ordinary layman so abstract as mathematics. Where the definitions of the university are not accepted bodily, the advice of the principal is generally sought, occasionally that of the head of the department, or of the special teacher of mathematics.

Importance of the textbook.—There are States in which the textbooks are prescribed; in one all the textbooks of mathematics are prescribed as those of a certain author, reliance being placed on the publishers to keep his productions up to date. Some of the teachers replying to the questions of the committee state that no deviations from the textbooks are allowed; but this is doubtless the decree of the local authorities rather than of the State, and is undoubtedly due to the unpleasant experience of trying to connect the work of a radical experimenter with that of a successor incapable of appreciating and pursuing a wide and uncharted departure from the orthodox course.

Correlation of mathematical subjects with each other.—The different branches of high-school mathematics are not in general correlated with each other, but are pursued one after the other with such differences of method and of point of view that algebra is often forgotten by the time geometry is completed. Of recent years the teachers in a small number of schools have, of their own accord and with considerable difficulty, arranged the geometry work so that algebra can be applied to some of the numerical problems given in illustration of the metrical theorems. More than anything else the subject of proportion is treated algebraically. In a still smaller number of high schools there is a well-organized blending of the different subjects, algebra, geometry, and trigonometry, into a general and progressive course in mathematics.

The customary independence of these mathematical subjects is restricted almost everywhere by the requirement that a pupil must have "passed algebra" before he is permitted to begin geometry.

Correlation with science.—The mathematics work is little correlated with physics, though many schools insist on algebra at least, and sometimes geometry or even trigonometry, before beginning physics. The requirement of algebra for chemistry students also is not unknown.¹

¹ An ideal state of things is described by Miss Thirmuthis Brookman, as the result of 12 years' development in the high school of Lincoln, Nebr. Here an "inspirational" half-year course in general science serves as an introduction to a course in mathematics, where each week's work is "a definite and clear-cut section of a well-proportioned system," including algebra, geometry, and trigonometry. Pupils showing marked inability in the general science introduction are not urged to enter the work in mathematics.—School Review, January, 1910.

THE SUBJECT MATTER.

Elementary algebra and plane geometry.—Every regular high school in the United States offers algebra and plane geometry for at least one year each. Half of them give algebra for an extra half year; less than 20 per cent give algebra for two full years. A very few schools give algebra for two years and a half, and a very few give plane geometry for a year and a half.

Solid geometry, trigonometry, and college algebra.—Solid geometry for a half year, plane trigonometry (often with spherical right triangles, occasionally with the general spherical triangle¹) for a half year, and advanced algebra, so called, including certain special topics listed below, for a half year, are given in some of the larger high schools or in some of the smaller ones that definitely prepare for college.

The textbook as evidence.—The fact that few of the high-school teachers of mathematics are thoroughly trained in their subject and that the subject matter is settled for the most part without their initiative indicates that the content of the curriculum will be closely defined by the textbooks used. This is also the comment of publishing houses in discussing new textbook projects: "We must have a book that the ordinary teacher can follow without change; it is only the exceptional teacher that can strike out independently of its guidance."

The kind of textbook in general use up to 12 or 15 years ago, and the kind most widely used to-day, will enable us to define the subject matter and the methods of algebra, geometry, and trigonometry as presented to more than 75 per cent of the high-school pupils of the United States. Hereon is based the following outline.²

THE ORTHODOX SYLLABUS.

I. Algebra to Quadratics.

Introductory.—Definitions and "axioms," discussion of negative quantities, brief practice in algebraic expression and interpretation, one or two lessons in the use of algebra for problems so simple that algebra adds to their difficulty.

The four operations.—Addition, subtraction, multiplication, and division, completed successively in that order, with formal rules of manipulation (not necessarily stated in advance); literal and fractional coefficients and exponents used; ingeniously involved parentheses, brackets, and braces; and expressions sometimes more complicated than most of the pupils will ever see again.

¹ More than a half year is taken in this case.

² For the purpose of this outline only, "numbers" will be understood as expressed *without letters*, and "problems" will be understood as "clothed" in words.

Factors.—Factoring expressions, such as the difference of two squares, $ax^2 + bx + c$, $x^n \pm y^n$ (often with “demonstrations,” as of the case where the sign is + and n is odd); factoring “by parts;” forms like $x^4 + x^2y^2 + y^4$; expressions such as can be obtained from the simpler forms by substituting binomials for one or more of the letters. Usually no application is made of these feats except in the reduction of fractions, and in highest common factor and least common multiple, which follow as introductory to fractions.

Highest common factor and lowest common multiple.—Highest common factor, first by factoring, then by the Euclidean method. A demonstration is usually given for this, but is hardly ever assimilated by the pupils. Not seldom the proof given is applicable only to numbers—that is, it will not hold for literal expressions in which, as is usual, some of the dividends have to be multiplied and some monomial factors have to be saved out. Lowest common multiple, generally by factoring only, with a perfunctory comment on the method which utilizes the highest common factor.

Fractions.—Fractions, with the rules of transformation formally demonstrated, and the four operations each completed in its turn. Expressions of ingenious complexity are handled under each head.

Simple equations and problems.—“Simple” equations, that is, equations of the first degree with one unknown letter, and abounding in parentheses and fractions; and, at last, problems to be solved by means of such equations, except that the equations needed for the purpose are really simple.

Linear elimination and problems.—Two-letter linear equations, including fractional and literal equations; three-letter equations of the first degree, and occasionally simple four or five letter sets. Equations solved for the reciprocals of the letters involved. Problems leading to equations of the first degree in two or more letters. Literal equations are scattered at random under this topic and the preceding one.

Inference of equations.—The model examples worked out in the text-book generally indicate the inference of an equation from the preceding work by means of phrases printed at the side, such as “transposing,” “clearing of fractions,” “adding to eliminate the x terms,” etc. No expectation is indicated that the pupil will use any substitute for these annotations.

Neglect of practice in devising equations.—The number of problems given under this topic and the preceding one is generally insufficient to give real facility in algebraic expression, and their introduction seems isolated, an interruption in the progress of manipulation. Hastiness or neglect at this point is explained by the fact that no topic is more difficult to test adequately in a written examination than the

devising of equations, and where time is scant it will be devoted to topics that show.

Involution and evolution.—Under the title “Involution” next are treated powers of numbers and of monomials, and squares and cubes of binomials; under the title “Evolution” are treated square roots and cube roots of polynomials. Some details of the theory of exponents are necessarily included under these heads.

Radicals and radical equations.—Radicals, including the rationalization of binomial denominators, and the square root of a binomial surd (generally given without adequate demonstration); radical equations, carefully selected or constructed so as to give, upon rationalization, equations of the first degree. Extraneous solutions, sometimes declared admissible because of the “ambiguous” sign of the square root. Problems again, few in number, leading with suitable choice of letters to radical equations.

Exponents.—Theory of exponents, without any mention of logarithms; good correlation with the preceding topic.

II. Quadratics and Beyond.

Quadratics in one and two unknowns.—Quadratics in one unknown, first without the second term (“pure” quadratics) and then complete quadratics (“affected” quadratics); problems leading to such quadratics. Linear-quadratic pairs, elimination by substitution; special cases of quadratic pairs solved by devices suited to each case; special emphasis on symmetrical equations, solved by reducing to values for $x+y$ and $x-y$. Very few problems. Literal equations at random under this topic.

Ratio and proportion.—Ratio and proportion, including the traditional transformations of a proportion; examples of literal equations and of problems to which proportion can be applied if one insists; no mention of its application in geometry, and no comment on the relation of this subject to fractional equations. This topic is not referred to under any other part of the work in algebra.

The progressions.—Arithmetical progression; formulas for the n th term and for the sum of the terms, any three of the five constants being given, to find the other two.

Geometrical progression; formulas for the n th term and for the sum of the terms, certain groups of three of the five constants being given to find the other two constants. Formula for the “sum of the series” when the ratio is less than one and the number of terms indefinitely great; recurring decimals.

Inserting means.—Arithmetic and geometric mean; insertion of two or more arithmetic or geometric means between two given numbers.

Binomial theorem.—The binomial theorem for positive integral exponents; proof of the same;¹ application to powers of a binomial of which the terms may be complicated with fractions, with radical signs or with exponents that may or may not be positive or integral. Formula by which any term of any power may be written down.

III. Plane Geometry.

The five books.—The sequence in all the ordinary textbooks is that of Legendre; five books, the first on lines, angles, triangles, and other polygons; the second on circles and the measurement of angles; the third on proportion (treated as an algebraic subject) and similar figures; the fourth on areas; the fifth on regular polygons and the measurement of the circle.

Incommensurables.—Incommensurable ratios occur in Books II, III, IV, and V; in most schools an attempt is made at every one of these points to master the explanations given in the book.

Construction.—Geometrical constructions, to be made as with Euclid by the use of the compass and unmarked straightedge, are given in a logical place among the other propositions. Locus theorems are given, beginning with the bisectors of angles and the perpendicular bisectors of lines in Book I.

Original exercises ("riders").—Exercises are given for practice in the invention of demonstrations similar to those in the text, and in the application of available theorems to numerical data. These exercises reach the number of 500 or 600, and are often accompanied by suggestive notes or diagrams. They are for the most part rigidly confined to subject matter like that in the text, so that successful practice with them does not add materially to the geometrical information of the student.

IV. Solid Geometry.

Order of topics.—This includes successively the following topics: Perpendicular and parallel lines and planes; diedral, triedral and polyedral angles (including the ratio of incommensurable diedrals); equivalence and congruence among, and the measurement of, parallel-piped, prisms, pyramids, cylinders, and cones; the geometry of great-circle diagrams on a spherical surface, with scant reference to the corresponding polyedral angles at the center of the sphere; the surface and volume of the sphere.

Mensuration theorems.—Development is almost never used for the lateral areas of cones and cylinders, and the assumption that there is a quantity spoken of as "the area" of a cylinder, cone, or a sphere is tacitly made (a similar assumption having been made for the "length" of the circumference in plane geometry), the areas of successively

¹ In most classes this proof is omitted in teaching.

approximating figures approaching this assumed quantity as a limit. The important distinction between area and volume in this respect is not commented upon.

Method of limits.—There are about a dozen places in plane and solid geometry in which the method of limits is used to deal with the incommensurable numbers which have arisen in the work. In nearly all cases the proofs are so cast that a variable number is determined in two different ways independent of each other, and use is made of the following “Theorem of Limits”:

“If two variables are equal and each approaches a limit, the limits are equal.”

Pupils seem to be able to learn to repeat the words of this theorem while failing in many cases to appreciate the cogency of the proof in which it is used. The treatment of limits in geometry is the source of much discontent not only among the teachers themselves, but also among the university examiners and professors.

V. Trigonometry.

Introductory.—Definition of the functions of an acute angle; generalization to angles in any quadrant. Representation of the functions by lines drawn on a unit circle; change in the values of functions from one quadrant to another.

Formulas.—Proof of the formulas for the sine and cosine of the sum and of the difference of two angles; of the tangent of the sum and of the difference; of the sine, cosine, and tangent of the double and the half of an angle; formulas for the transformation of the sum or the difference of two sines or two cosines into products; practice in the use of all these formulas in reductions.

Logarithms.—Generally logarithms are studied at this point.

Triangles.—Application of logarithms to computation of a right triangle; proofs of formulas for an oblique triangle, using trigonometric algebra as much as possible. Simple applications to surveying and navigation.

VI. Advanced Algebra.

Topics treated.—Under this head are given various disconnected topics including: Theory of quadratic equations, with graphs of $y = ax^2 + bx + c$; solution of numerical equations of higher degree in one unknown, with graphical illustration; occasionally successive derivatives of algebraic polynomials, geometrically interpreted, are incidentally taken up as far as advisable in utilizing graphs for explanation; occasionally trigonometric solutions are given for certain equations. Choice and chance. Determinants, with practice in reduction and evaluation (the multiplication theorem omitted). Indeterminate coefficients.

Purpose.—The sole purpose in this course seems to be to furnish information that may be useful in later mathematical study.

Confusion of title.—In many schools the latter part of the course in elementary algebra described previously is styled “Advanced algebra.” This usage is confusing and should be avoided.

VII. Arithmetic.

In addition to the subjects which are generally recognized as secondary school studies, many high schools give a half year in arithmetic. In smaller schools and in districts where the elementary schools are not so effective, either on account of short terms or on account of more recent establishment of public school education, this is given at the beginning of high school work; in other schools it is given after the years devoted to algebra and geometry, and is called “Advanced arithmetic.” The topics are not in any respect different from those treated in elementary schools, though the problems are somewhat more difficult and aim at a closer correlation with commercial practice. There is a decided purpose to attain facility and accuracy in routine operations. Little or no effort is made to treat arithmetic as a science, or as having any real connection with the other mathematical subjects in high school work.

GROWTH OF THE COLLEGE REQUIREMENT.

Harvard College as Example.

Advance of the last 60 years.—The definition which we have just completed of the subjects of mathematics covered in high school work represents a very considerable advance over the conditions 60 years ago. This change can be well traced by a study of the requirements for admission to Harvard College.

Early textbooks.—In 1845 Lacroix’s Arithmetic, Euler’s Algebra, Davies’s First Lessons and his Introduction to Geometry “to VII of Proportions” and “Algebra to the Extent of Square Root” were required for admission; this was a larger requirement than was made at that time by any other New England college.

In 1866 Chase’s Common School Arithmetic, Sherwin’s Common School Algebra “to Section XXXVIII,” and Hill’s Second Book in Geometry, parts I and II, were required. The algebra requirements so defined omitted radicals and fractional exponents, proportions, and algebraic and geometric progressions. The scope of the geometry requirement is considerably less than that of the subject of plane geometry to-day; it is developed in the textbook referred to by first acquainting the pupil with the facts of geometry, and then discussing the methods of proof, together with some suggestion of how proofs can be arrived at.

The next year the metric system was added to the arithmetic requirement, and algebra was defined as “through quadratics.” No

reference was made to a particular textbook for these two subjects, but elementary plane geometry was defined by the "first 13 chapters of Pierce's Treatise." In the next year the practical use of logarithms (not the theory) was advised, and was required the following year.

Elective requirements.—In 1870, while the old subjects of examination were retained for such as chose to take them, an alternative specification was made with a much reduced requirement in Latin and Greek and an increased requirement in mathematics. This included permutations, probability, determinants, in algebra; solid geometry; theory and use of logarithms; plane trigonometry "by the analytic method"; elementary mechanics and hydrostatics.

For some years the experiment was tried of accepting plane analytic geometry as an examination subject; but it seems to have been on the whole unsatisfactory, and within the last 10 or 12 years it has not been included among the alternative requirements for admission.

Changes in subject matter.—The textbooks by Thomas Hill, referred to above, contained a few numerical exercises and "originals" (riders), and did not rigidly limit the subject by the compass-and-ruler canon; Davies's Legendre, which was much more widely used, was merely Euclid rearranged; it was studied more often as a classic document than as a scientific textbook; and it contained no originals. Chauvenet's geometry, published about 1870, contained good originals, not very carefully graded, 281 of them on the five "books" of plane geometry. It was not until 1875, and then only for an "optional" examination, that originals in geometry appeared among the requirements for admission to Harvard College; for this the exercises in Chauvenet's geometry were recommended as affording a good preparation.

In the textbooks of algebra 50 years ago much more stress was placed on logical exposition than on the solution of problems. The development of arithmetic, as followed in the textbooks of the elementary school, was faithfully imitated in algebra, and various "operations" (some, like the square and cube root of polynomials, having no conceivable use, and others mere pedantic elaborations of methods that in simpler form were well worth while) were laboriously discussed and exploited before the use of equations in discussing problems was entered upon.

The algebras of Todhunter and Hamblin Smith, in England, were followed in America by Wentworth's Algebra, published about 1881. The exercises in the latter book, which were widely commended by the teachers of the day as "well chosen, numerous, and carefully graded," were the selling feature, and the book sprang into great popularity at once. The idea was to "learn by doing," and since that time the exercises have been of much greater importance in textbooks and in teaching than before.

Causes of change.—The changes thus noted in the school work of algebra and geometry are the result of attempts to take subjects that were originally a part of the college curriculum and adapt them to the comprehension of high-school pupils. Abstract discussion was to be replaced by means for practical drill; the teacher, rather than the mathematical scholar, was the arbiter in choosing books. At first he rejected books like Hill's and Sherwin's, which were actually better adapted to his classes, for those which had been familiar to him in his own work in college. From those the progress was gradual. Ten years ago a prospectus of the two books last referred to would have seemed quite up to date.

RECENT PROGRESS.

The last 10 years.—In the last 10 years changes in the details of high-school mathematics have been radical and rapid.¹ They are largely the result of the active interest taken in the work of high-school teachers by university professors, and of the conference between high-school men of different localities. Both of these influences have made themselves felt through teachers' associations. So far as the changes and tendencies referred to have actually begun to affect teaching, they appear in recently published textbooks in good use. For this reason the committee has examined some thirty of the recent high-school books on algebra, geometry, and trigonometry, and presents the results of that examination here.

The order of topics.—In almost all these books geometry is supposed to follow a year's work in algebra, though there are one or two books, whose success is still not completely assured, which essay a combination of the two subjects. A combination (or "blending") of plane and solid geometry does not seem to have been seriously attempted.

In algebra the order of topics is only slightly varied from the following:

1. Introduction, negative numbers, etc.
2. "The four operations."
3. Factors, H. C. F. and L. C. M. by factoring.
4. Fractions.
5. Simple equations and problems.
6. Elimination, linear systems.
7. Powers and roots, exponents, radicals.
8. Quadratic equations.
9. Elimination of quadratics.
10. Literal equations, generalization.
11. Proportion, "the progressions," logarithms.
12. The binomial theorem.

¹ See "Present Tendencies in the Teaching of Geometry" (in the United States) in A. W. Stamper's History of the Teaching of Geometry, New York, Columbia University (1906).

In geometry the order of development is still mostly that of Legendre, the five books of plane geometry being successively polygons, circles, similar figures, areas, and regular polygons; and the solid-geometry order being planes and lines, polyhedral angles, prisms and pyramids, and the "three round bodies." Two books transpose the third and fourth books of plane geometry; here and there also is shown a disposition to group propositions in smaller lists than the "books," without, however, changing the order much.

The textbooks in trigonometry agree fairly well on the topics which should be taken, but differ widely in their estimate of the relative importance of these topics.

A common arrangement of topics is the following: Functions of an acute angle; solution of right triangles by natural functions and by logarithms; functions of any angle; general value of an angle; the addition and subtraction formulas; formulas for double an angle and half an angle; the conversion formulas; and the solution of oblique triangle by logarithms. In addition to these topics, we find the radian measure, inverse functions, and the line representation of functions, and, in some books, graphical discussion of functions and a careful treatment of the measurement of angles near 0° and 90° .

Graphical methods of discussion.—For some 15 years there has been increasing pressure for the introduction of Cartesian coordinates as an instrument of study in elementary algebra. It began to appear in the schoolbooks about 1898. All but one of the books here examined make use of this device; sometimes it is given in a separate chapter, in one case in an appendix. In a few others it is made an effective part of the structure of the subject. The word "function" is sometimes used, but even without it the work generally begins by plotting curves in which y is a non-algebraic function of x , so that the student gets some insight into the functional relation.

The graph of a two-letter linear equation is pointed out as a straight line. No proof is given, though one book remarks that the "proof follows easily from the geometry of similar triangles." Elimination of linear pairs is illustrated, generally also linear-quadratic and quadratic pairs. No comment is made, as a general thing, on the limitation of this illustration to two-letter equations.

In about one-half of the books the solution of a numerical quadratic equation by the use of a standard parabola ($y=x^2$) and a straight edge is mentioned, and its use recommended as a check on the solution obtained by the algebraic process.

Computation.—In spite of the fact that John Perry's propositions for reform in mathematical teaching have been widely and on the whole favorably considered in this country, not one of the textbooks of algebra, and only one of those in geometry, makes any reference to the number of significant figures in a number as a criterion of the

degree of approximation. None gives any directions for economical methods of computation having regard to the degree of accuracy warranted by the data, or gives problems with data appropriate for such practice.

In a geometry textbook of excellent character and long use, problems appear in which the data are such as would occur under the actual circumstances described in the problem; but no directions were given for dealing economically with the difficulties of arithmetic thus introduced, and the problems were considered unsuitable by the schools. In the more modern books here examined the data are all of the predigested sort (one or two-figure integers).

In trigonometry the subject of approximate computation in general, and the fact that only approximate results can be obtained by the use of trigonometric functions, are rarely referred to.

Checks.—The practice of checking the solution of an equation in algebra by substituting the roots, and checking an algebraic transformation by substituting arbitrary values, appears in almost all the algebra textbooks. In trigonometry the subject of checks for the solution of triangles is not carefully treated—several books give no checks except the obvious one for the angles when the sides of the triangle are given. The topic does not appear at all in geometry. No reference is made anywhere to methods of checking the details of computation; it being assumed, no doubt, that the matter has been adequately treated in the study of arithmetic. The textbooks in that subject, and the irresponsible habits of the pupils in computing, do not furnish good ground for such an assumption.

Notation.—In algebra there is a tendency to break the monopoly that the letter x has had in representing numbers whose value is sought. The symbol $\neq$ for “is not equal to” and the symbol $\equiv$ for algebraic identity have come into use. In geometry the symbol $\equiv$ is apparently favored for congruence, instead of $\cong$, which already had good authority. For the exceedingly mysterious thing which some authors call the “intrinsic” sign of a number, a diminutive plus or minus sign is sometimes used.

The notation of lower-case letters for lines and for lengths of lines has at last been introduced into elementary geometry textbooks, to the great advantage of the algebraic proofs. This appears in three of these books, one of which applies it very imperfectly. The same book also uses lower-case letters to represent the number of degrees in an angle, though analogy to the unlimited and the limited straight lines would suggest using a capital for both the point and its associated magnitude, the angle.

Logical terms.—The technical terms of logic are mostly avoided. The term “*reductio ad absurdum*” occurs in three; the same thing is called “*indirect proof*” in four others; the “*method of exclusion*” is

pointed out in three. "Reductio ad absurdum" and the "method of exclusion" are both classified as "indirect proof" in one book, while "indirect proof" and the "method of exclusion" are both classified as "reductio ad absurdum" in another. One book manages to avoid all mention of these terms.

The logical inverse is called the converse in all current textbooks, and there is no exception in these latest books. The obverse is so called in one book, is called the opposite in two others, and is omitted in the rest. The contrapositive is so called in one, is called, curiously, the contradictory in another, and is not mentioned in the rest, although one book points out the equivalence of the converse and the opposite.

The term "immediate inference" is given and much used in one book. Homothetic position is used for the similarity theorems in two of these textbooks, but under different names ("radially situated," "in perspective"), and in only one of them is it systematically used as a means of demonstration.

Innovations.—The changes in the subject matter of algebra have been referred to under preceding heads. Those in geometry are much less extensive, no doubt because of a widespread belief in the invulnerability of the logical structure represented by the successively dependent propositions. The treatment of incommensurable magnitudes in geometry seems, in particular, to be protected by sacred tradition.

The theorem of limits, namely, that "if two variables are equal and each approaches a limit, the limits are equal," is used systematically in all but two of the books examined, and one of these puts it in an appendix.

The similarity theorems are based on the area theorems in two. Axial and central symmetry are both used in three, and neither appears alone. The idea of symmetry is used for comment and illustration rather than as a method of attack or as a resource in argument.

A decided innovation is the custom of explaining methods of attack for new theorems; this is contained in almost all of the newer textbooks.

The word "congruent" is used in four books, one of the others using the old-fashioned phrase, "equal in all respects." Only one of the books using the word "congruent" uses the word "equal" in the sense of "equivalent."

In solid geometry also there are few innovations—that is, innovations so far as really popular use is concerned. Among them are shaded figures or photographs of actual models, the spherical degree (or "spherid" as one book calls it) as the unit of area on the sphere, and the prismoidal formula. None of the books speaks of a "unit of solid angle;" it is always a "unit of area on the sphere." Some,

even of the most enterprising of these authors, adhere to the trirectangular triangle as a unit. The prismoidal formula is apparently not introduced as a means of simplifying the logical structure; it is rather a new addition to the old task.

Problems in algebra.—Much more space is given to equations, and to problems giving rise to equations, as a response to the frequently repeated contention of teachers, uttered in magazine articles and in teachers' associations, that the equation should be the fundamental work at least for the first year. In most cases, however, the preparatory study of transformations (multiplication and division, factoring, fractions, etc.) is carried to a degree far beyond what is necessary for the manipulation of any reasonably probable equations, certainly beyond what are given during first-year work. The study presents, therefore, a somewhat disconnected aspect—first, transformations treated in a systematic and fairly complete fashion, with a few intrusive illustrations of the application of them to equations that do not need much; then, equations treated as material for practice of a small part of this manipulation; and, finally, problems, hopefully sought from newer quarries, designed to show how equations might arise that could be managed by this manipulative skill.

It would probably be easy for a young person of good judgment, engaged in reviewing his high-school algebra, to learn that problems cause the invention of equations, and that transformations are necessary for the solution of equations. The prominence given, however, to this systematic development of what must be considered the mechanical side of algebra tends to weaken the interest of the pupil in that part of the subject that is of most value, not only to him whose education stops with the high school, but surely also with the future student of engineering or of pure mathematics; the study, that is, of expressing the conditions of actuality in mathematical form, and of interpreting mathematical results in terms of time, space, and things.

The problems in all these books are very plentiful; sometimes the teacher is warned that the work should not include the solution of *all* the problems, and that their profusion is his opportunity to vary his work from class to class and to specify fresh problems for review lessons. While the character of the problems in three of the books is strictly orthodox, the others take their data freely from geometry, physics, and even from engineering and dietetics (!). There is no hesitation in utilizing the properties of similar triangles, or the phenomena of falling bodies; but there is a chaste reluctance to do anything more than mention the existence of reasons at the back of the facts and formulas used. Our old friend the clock problem survives the dead and buried hare and hound, and the solution in odd elevenths of a second continues to pass without challenge.

Long division, square root, and generally cube root of algebraic expressions are still treated at length, without any comment on the futility of the pupil's attempt when the result does not "come out even."¹

The comment that an extraneous root of a radical equation can be made to satisfy the equation "by suitably choosing between the two possible signs of a square root" is passing out of use.

Problems in geometry.—The number of "original" exercises to which the pupil is expected to apply his newly acquired knowledge varies from 600 to 1,200 in plane geometry, and from 300 to 600 in solid. Some of them use freely the results of the modern geometry of the triangle and of projective geometry, but without any introduction of the corresponding modern methods in the text. One book, however, includes the nine-point circle, the radical axis, and the notion of reciprocal theorems in the regular text, but omits all mention of symmetry.

Some effort is made to create a "practical" atmosphere, and one or two modern books are rich in allusions to and illustrations of such things as surveying, parquetry, and architecture. They are dealt with, however, by the sometimes cumbrous methods of Euclidean geometry, instead of by such means as practical men would use.

The fundamental definitions of trigonometry appear, and in a couple of books the tables of natural functions; in one there are two-place tables, in the other a four-place, while in both is used what seems to be a three-figure angle (degrees, and tenths by interpolation).

Loci.—The definition of a locus is introduced at the very beginning in one textbook; in Book II in another; in most of them it appears in Book I in connection with the theorems about perpendiculars and bisectors. In no textbook does the locus of an algebraic equation in two variables appear, though this would seem a not inadvisable corollary of the introduction of graphs into algebra. The nearest thing to it is the problem to find the locus of a point moving so that the figures determining it retain certain numerical properties, as in the locus of the vertex of a triangle with fixed base and constant perimeter. The "real" or "practical" locus problem is still rare; a type of such is the artisan's way of testing the cross-section of a cylindrical core box with a steel square.

While no reference whatever is made to the locus of an equation in the text books on geometry, some of the trigonometries use it in tracing the changes in the values of sine, tangent, etc., as the angle varies; all of them, however, make some reference to the representation of the trigonometric ratios by lines related to a unit circle. Only one comments on the important fact that here we have a line representing a pure number.

¹ See Missouri Teachers' Course in Algebra, § I, (b), § X, (c). School Science, April, 1908.

Problems in trigonometry.—The problems in trigonometry textbooks comprise the proofs of identities and the numerical solution of equations as opportunities for practice in the transformations of trigonometric expressions; and also the solutions of plane triangles, with applications to questions of surveying, civil engineering, and navigation. The pupil is expected to remember all the formulas referred to on page 21.

Spherical trigonometry is usually considered a college subject, but spherical right (and quadrantal) triangles are often dealt with in the secondary school. With these the so-called Napier's Rules furnish the possibility of memorizing formulas, apparently an indispensable requisite in subjects offered for admission examinations.

Only one of these books mentions the fact that oblique triangles may be solved by dividing them into right triangles. The idea of projection and of the angle functions as projection ratios does not enter into these books. One book refers to it, but makes little use of it.

The solution of oblique triangles comes late, following the addition and subtraction formulas. One book gives a geometric proof for the tangent formula. Angles are generally expressed in degrees, minutes, and seconds; two books have degrees, minutes, and decimals of a minute, and one has a set of examples in which degrees and decimals of a degree are used. Few books have a discussion of the theory of logarithms. It is evidently assumed that the student has received from algebra a knowledge of the nature and properties of logarithms sufficient for the practical application to the solution of triangles. The use of the augmented characteristic in the case of a negative logarithm is almost universal.

We find in one textbook the radian measurement introduced on the second page in the book and no further use made of it, while in another book it is found well along in the book, where an excellent discussion of it is given, and frequent use is made of it in equations, identities, and problems. We find a similar condition of affairs when we look for the inverse functions.

Only one of the books completes the solution of plane oblique triangles before entering upon the discussion of the standard formulas of trigonometric algebra.

EXAMINATIONS.

Before the high school.—Examinations are not generally required of pupils applying for admission to high school if they have been advanced through the regular grades of the school system up to that point. Pupils from private schools or from distant communities are in general examined for admission.

In the high school.—Examinations are required for promotion each year and for graduation. In a very large percentage of the

schools replying to our questions pupils attaining high marks (generally 90 per cent) in class work are excused from these examinations.

After the high school.—Examinations are required for passing from high school to university except for pupils certified from an “accredited” high school; that is, one of which the university has officially approved the course of study and method of teaching. This privilege is continued only to those schools whose pupils bear out in the main the favorable opinions expressed on their certificates.

Effect of examinations.—As to the effect of these several classes of examinations on pupils and teachers, diametrically opposite views are expressed, the weight of opinion being apparently favorable so far as the examinations in the high schools themselves are concerned. Various modifications of the university admission examinations are suggested, such as permitting the pupil to take all his books into the examination room and to use them as he chooses; the perfection and extension of the accrediting system is also suggested.

“Accrediting” elementary schools.—For passing from elementary schools to high schools a few suggestions were made looking toward a system similar to the certifying of high-school pupils for college, a system in which the high schools should maintain an attitude of friendly criticism toward the elementary schools, testing their work rather by its efficiency as preparation for subsequent study than by a written examination.

METHODS.

Relative popularity.—In the questionnaire issued by this committee 12 methods were listed, the names being taken from well-known books on the teaching of mathematics. The replies indicated clearly, by practice or preference, that five of these methods were most popular:

Measurement and computation.

Laboratory method.

Use of models.

Use of cross-section paper.

Individual method.

Next in order of popularity, after a considerable interval, come the following:

Combination of algebra and geometry.

Out-of-door work.

Paper folding.

Observational geometry, to precede deductive geometry.

The least popular of the 12 suggestions offered were the combination of plane and solid geometry and of geometry and trigonometry; next to them in unpopularity, curiously enough, is the “heuristic” method; and, in view of the noticeable tendency in recent and widely adopted textbooks, the inference is unavoidable

that this apparent unpopularity is due to the fact that "heuristic" is a hard word.

On the other hand, the low position of "observational" geometry in these reports is significant. A progressive teacher in Arkansas writes: "We tried a six weeks' course in observational geometry in the second high-school year and saved time by it, but the pupils did not like it; they were too old." The most successful work in observational geometry has been in schools where it could be done by pupils of 12 years of age; the six-year high school is probably a necessary condition for the best use of this expedient.

Outdoor work and paper folding depend on local conditions and individual teachers, respectively. One high-school teacher borrows a transit from the city engineer every spring. Paper folding, used occasionally for symmetry propositions at the beginning of geometry, has not been found available for much else.

The combination of algebra and geometry has a good start in the sense that algebra is applied to the discussion of geometry problems involving numerical relations, but except in isolated cases there has been no blending or interweaving of the two subjects into one.

The five topics listed as the most popular emphasize the decided tendency to cultivate the intuitional side, to utilize sight, touch, and muscular sense as avenues to the pupils' intelligence.

Separate problem book.—One or two attempts have been made by publishers to present algebra by means of a manual and an exercise book separately, but except for review work this plan is hardly ever followed. Principles and practice appear not only in the same book, but as nearly as possible on the same page.

The use of models.—Models, in most cases made by the pupils themselves with cardboard, wire, and fine cord, or thread, are very much used in solid geometry.

The model for equivalent parallelopipeds and for the dissection of a triangle prism into three equivalent pyramids can not generally be so made, and the school owns the patterns, if it is not so fortunate as to own the right sort of teacher. The spherical blackboard is generally used.

Squared paper.—Cross-section paper is very much used, generally for the illustration of elimination, sometimes also for the introduction of the idea of function. A considerable opportunity here for the correlation of algebra and geometry seems to be entirely neglected. Little or no attempt is made to find approximate solutions graphically, in cases where elementary algebra will not help out.

Computation.—Measurement and computation are undertaken in true schoolroom style. No attempt is made to work to a specified degree of accuracy, or to acquire convenient and systematic habits of computation. Logarithms are only used in the trigonometry class, and the slide rule has not appeared in high schools.

Improvement of problems.—Search is being made everywhere for problems that make a more direct appeal to the interest of the pupil than the collections handed down by previous generations. Even in the not infrequent case where these problems are themselves highly improbable as instances of perplexity in human beings, some gain is made by clothing the inventions of the schoolmaster in the words of people that walk the streets to-day, and a great many of them are “real” problems of “practical” import.

The marks.—The marks by which pupils are ranked and promoted are most frequently based on oral recitations and on exercises written out in the classroom; written examinations at stated intervals and the teacher’s general estimate of the pupil’s power and achievement are also utilized for this purpose; and least often exercises written out at home or voluntary original work.

Failures.—Failures are reported as low as 3 per cent of the membership of the class and as high as 45 per cent; most of the reports are evenly distributed from 5 to 25 per cent. The State superintendent’s report for New Hampshire is probably a typical result for small high schools; it contains the following details:

Results of examinations.

	Number passed.	Number failed.	Per cent failed.
First year algebra.....	1,666	385	19
Second year algebra ¹	364	45	11
Third year algebra ¹	668	23	3
Plane geometry, Books I and II.....	1,243	134	10
Plane geometry, completed.....	632	23	3
Solid geometry.....	169	7	4
Advanced arithmetic.....	590	95	14
Trigonometry.....	84	1	1

¹ Second and third year algebra are not consecutive.

All the results reported are likely to give too low an estimate of the number of failures, mostly because they are tested from the point of view of the teacher conducting the course, and with a view to deciding whether work assigned has been performed; not by ascertaining the pupil’s efficiency in a subsequent course of study for which his high-school work is a necessary preparation. A special report on failures in high-school mathematics has been prepared by a subcommittee of which Mr. William Betz is chairman.

Unsatisfactory records.—The pupils’ marks in different studies are generally entered on a permanent record, available for reference in subsequent years. The keeping of these records is an irksome task, involving a considerable amount of clerical labor after the actual teaching has been completed; it is often neglected. So far as furnishing data from educational experience is concerned, it is practically worthless, and will continue to be so until it is very much expanded.

Valuable details unattainable.—Any investigator consulting a high-school record would be unable to ascertain whether a pupil is proficient in numerical computation, in algebraic manipulation, in knowledge of mathematical facts, in comprehension of successive logical dependence, in mathematical invention and ingenuity. These are presumably the qualities his mathematical studies are to develop. A pupil at the head of the rank list might be presumed to be excellent in all, and one at the foot to be a failure in all, though this is not necessarily so; a pupil midway between head and foot may have conspicuous defects in some of these and conspicuous excellencies in others, and it would be extremely important to have this fact definitely known.

Educational values.—Again the various educational improvements suggested from time to time, such as the practice of checking numerical work, the use of cross-section paper, the use of a textbook without full ready-made demonstrations, may produce results that are not aimed at, which can only be discovered by the isolation of these marks. In general, such records as these would be indispensable for long-continued educational experiment, or for statistical investigation.

No device suggested.—The great majority of our replies, while admitting that such a system of records was not in use, were decidedly in favor of it, but expressed great doubt as to its feasibility. The only suggestions made for the purpose were to the effect that specially ruled class books (marking lists) would be desirable.

Mathematical museums.—Practically every high school has some mathematical instruments, models, etc., but mathematical museums comparable in any degree with that at Columbia University are very rare, even in university towns.

Mathematical clubs for pupils.—Of mathematical clubs to which the pupil has access, there are very few. There is one at the Stuyvesant High School for Boys in New York, and one is promised at the William Penn High School for Girls in Philadelphia. The McKinley High School in St. Louis reports as follows:

The Mathematical Club of the McKinley High School has been organized for three years. During the earlier part of the organization the history of elementary mathematics was studied. Topics were assigned to the different members of the club and reports were made upon these. Along with this work mathematical curiosities and puzzles were presented and discussed. The more recent work has had to do with the use of the slide rule and all kinds of graphic solutions; problems were selected that would show wide use of the slide rule, and other problems to show the value of graphic methods. Mathematical puzzles were continued.

AIMS.

General culture and college.—The aim of high-school education, so far as mathematics is concerned, is general culture, and at the same time is preparation for college. There is a slight preponderance of popularity in favor of the former reply, but the latter is close enough

to it to make it clear that in the minds of school committees and other official bodies, general culture seems to need the sort of mathematics that is prescribed for admission to college. A considerable fraction—from 25 per cent in the Middle West to 75 per cent in the Atlantic States—include preparation for technical institutes as a part of the purpose that mathematical education is to fulfill.

Not for occupation.—Of the careers that teachers are consciously looking forward to for their pupils, those of the merchant or accountant, the civil or mechanical engineer, the teacher, the farmer, and the “woman of the house” are frequently mentioned. It may well be doubted whether the mathematical training received in high schools gives added efficiency to any degree, in any of these callings; that is to say, the effect of the kind formerly acclaimed and now discredited under the name of general discipline; certainly not to any greater degree than the same amount of time and interest applied to geology, or chemistry, or even to music. The pupil learns to solve algebraic equations, but does not apply them to devising balanced rations for the farm stock out of the crop he raises; he learns about similar triangles, but knows not so much as his grandfather about the thrust on a girder, or about the way of mapping a river, or of estimating the amount of excavation in grading the house lot. He is brighter and keener, because he has been educated, and he has self-reliance because he has done things by his own thinking power; but he has had nothing directly contributory to the special knowledge or aptitude required for these occupations that he may follow—except teaching; surely he can teach what he has been taught, and he does. Thus schools inherit.

The college determines the aim of high-school work.—Since the high school does not prepare by means of mathematical teaching for occupations in which the pupils may subsequently engage, and since mathematics as deemed desirable for general culture is defined by the entrance examinations of the university, the whole question of the aim of this subject in high schools must be decided by the views of university people, and made known, aside from the scanty information of catalogues, by the character of examination questions. On this account the report on examinations will be of great interest.

The presumption is, then, that the subjects of high-school mathematics contain information and cultivate aptitudes that are necessary and useful in college mathematical work; or that so far as they do not do so, they are more useful in other ways than subjects that would do so. This is not true.

No systematic study of the desiderata.—The subject of geometry, for example, passed down from the university to the high school, continued to be taught with little change of content or method as a consequence of the transfer. There is no indication that the present

syllabus of high-school mathematics has been adjusted by university professors to the needs of their departments. Nobody knows what parts of it are absolutely necessary for subsequent work in exact science, or whether any of the necessary parts could with advantage be postponed to the university and replaced by topics of interest and of greater value to high-school pupils.

The question is not discussed in such a systematic way as that. Changes that have been brought about, mostly additions, have been fortunate guesses, proposed by tentative examination questions and afterwards reenforced by argument and formal demand. Such are the locus problem and the "original" or "rider" in geometry, the use of graphs in algebra. Within a few years some inconsiderable omissions have been made, such as the division process for H. C. F. in algebra, the square root of a binomial surd, and so on; and a decidedly critical attitude has been maintained against the traditional type of problems based on highly impractical data. All these things, while not aimless, can fairly be called tinkering rather than scientific reconstruction.

Influence of teachers' associations.—The formation of associations of mathematical teachers, in which university professors are actively interested, is bringing about a different attitude on this subject. Several of them have prepared and published reports on aims and methods in algebra and geometry. The most thorough and scientific work may be expected from the committee appointed recently by the National Education Association to form a syllabus of elementary geometry. The plans of that committee include an inquiry into all the considerations that should weigh in determining the scope of the subject, and its membership is such as to warrant the expectation of valuable results.

II. REPORTS OF SUBCOMMITTEES.

SUBCOMMITTEE 1. BOYS' HIGH SCHOOLS.

In order to obtain material for this report, questionnaires were sent to 25 boys' high schools—all that could be found—in various parts of the United States. Replies were received from 10 of these schools, and this report is a summary of the information thus received.

Though the number of schools which sent replies to the questionnaires was not large, they include some of the largest and most important schools in the United States. Of the 10 schools replying, one has 2,800 pupils; four have between 1,000 and 2,000; three, between 500 and 1,000; and two, less than 100. Two are situated in the Southern States, three in New England, two in New York, one in Pennsylvania, and two in Maryland.

ORGANIZATION.

In eight of these schools the department of mathematics is organized with a head usually nominated by the principal of the school, with the approval of the superintendent of schools. No information was obtained in regard to the general management of the department.

In six of the schools the teachers of mathematics have to teach other subjects, and in half of the schools they have work other than teaching, such as the supervision of athletics, pupils' organizations, or journalism.

The teachers of mathematics are generally members of some association of teachers of mathematics, and four of the schools report that these associations have some influence on the teaching of mathematics in the high school. It does not appear that there is any similar influence exerted by the mathematical departments on the teaching of arithmetic in the elementary schools.

The average age of pupils at entrance is about 14 years; three schools report the age as 15 years, and one as 13 years. In all the schools the available work in mathematics extends throughout the entire school course. The four schools in the South and in Maryland report racial restrictions against certain classes of pupils, presumably against the negro. Promotions in seven of these schools are annual, in three semiannual; by class in four, and by subject in six. The reports in regard to the per cent of the whole number of pupils taking mathematical courses are unreliable, owing evidently to a misunderstanding of the question.

THE MATHEMATICAL CURRICULUM.

The mathematical curriculum is generally determined by school-board courses of study, and these are influenced largely by the requirements of higher institutions of learning. Four schools report that recommendations made by the principal and approved by the superintendent have great weight in determining and modifying the curriculum.

The different branches of mathematics are correlated in six of the schools. The correlation generally means some sort of combination of algebra and geometry, or geometry and trigonometry. In nine of the schools the course in mathematics is progressive, in the sense that admission to second-year mathematics is conditioned upon the satisfactory completion of the first-year course, and so on. Mathematics is correlated with other studies in about half of these schools, and physics is usually mentioned as such a study. One school states that algebra, geometry, and trigonometry are required of pupils who take physics. Another school says that the science, drawing, and mathematics departments are working together by

furnishing problems and explanations which relate to the other departments. Six of the schools made a report on the sequence of topics in the course. Five of them begin with some work in arithmetic, and then take algebra, plane geometry, solid geometry, and trigonometry in the order mentioned. Two schools report spherical trigonometry and one analytical geometry.

EXAMINATIONS.

Usually pupils coming into these schools from the elementary schools of the town or city are admitted without examination. All but two schools require examinations for graduation. In one school pupils who attain high rank, 90 per cent or more, are excused from the examinations for graduation.

Five of these schools secure the admission of their pupils to higher institutions of learning by certificate, and five by examination.

Opinion is divided as to the effect of these examinations, though a small majority of answers seem to indicate that the teachers believe that the examinations for graduation and for admission to higher institutions have a good effect, both on the teaching of mathematics and upon the pupil's attitude toward the subject. In the case of those schools that are not favorably disposed toward these examinations, it does not appear that any attempt has been made to eliminate them.

METHODS OF TEACHING.

The laboratory method and the individual method of instruction are used in very few schools. Paper folding and outdoor work do not seem to be popular, but the use of cross-section paper is general. Observational geometry is taught in only a few schools. Some schools are trying to combine algebra and geometry, and geometry and trigonometry.

The marks by which the pupils are ranked are based most often on oral recitations, on exercises written in class, and on written examinations at stated intervals. The teacher's estimate of the pupil's power and achievement is also an important factor in determining the mark. In six schools written home work, and in eight schools voluntary home work are also used.

The per cent of failures varies from 10 per cent in one school to 40 per cent in another, but most of the schools report from 15 to 25 per cent of failures, with an average of 20 per cent for all the schools.

Very little attempt seems to have been made to devise a method of marking by which it would be possible to determine from the pupil's marks or record whether he is proficient in numerical accuracy, algebraic manipulation, knowledge of geometrical facts, comprehension of logical dependence, or mathematical invention and ingenuity. Three schools report such a method in use, and one of these is the

largest boys' high school in the United States; the other schools seem to take little interest in the subject. One report says that such a system would be useful "only for the purpose of diagnosing talent."

Only two schools, both in New York City, have access to a museum of mathematical models and instruments. One school, also in New York City, has a mathematical club where officers and members are pupils of the school.

AIMS OF MATHEMATICAL TEACHING.

All the schools report that the aim of mathematical teaching is general culture and preparation for college. It is evidently assumed that either one of these includes the other. Seven of the schools also prepare their pupils for technical schools.

SUBCOMMITTEE 2. GIRLS' HIGH SCHOOLS.

The report of subcommittee 2, on girls' high schools, is based on the results of a questionnaire prepared by the members of Committee III, and sent out by the Bureau of Education to all the secondary schools which came within the province of that committee. Replies were received from 12 girls' high and Latin schools. These reports have been tabulated and, in so far as possible, the facts and opinions elicited from individual schools on each question have been summarized. While on many points attitudes have proved so divergent that general conclusions are impossible, the replies as a whole indicate the general trend of mathematical teaching methods in this small but important group of schools.

The field of investigation undertaken in the questionnaire was divided into five main heads: Organization, curriculum, methods of examination, methods of teaching, and aims of teaching. A careful examination of the returns in these departments suggested the value of grouping replies to certain questions by the geographical sections represented, namely, Greater Boston, the Middle States and the Southern States. This plan was followed wherever there was an approach to uniformity among schools of each section combined with marked sectional differences. In certain other instances the main divergences appeared between the larger and the smaller schools. Three schools were represented in the Greater Boston group, five in the Middle States, and four in the South.

Summaries have been prepared for each of these groups and for the entire group of 12 schools. This report will concern itself, in the main, with the entire group, indicating sectional differences and individual peculiarities whenever they appear to be pronounced.

Taking up in detail the five main heads covered by the investigation, namely, (1) organization, (2) curriculum, (3) examinations, (4) teaching methods, (5) aims of teaching, the facts established and the opinions expressed have been arranged in order under these headings as follows:

ORGANIZATION.

Here the most marked divergence appears, between the three sections represented, in the matter of regulative powers attached to the office of principal. In the Middle States, the principal's power depends largely upon his personal influence; in Greater Boston he possesses general regulative power within the limits of a course of study fixed by the school board and acts in conjunction with the school board; in the South, on the other hand, the entire responsibility seems to rest with the principal. In the Pennsylvania schools the principal exercises his power in an advisory capacity, but takes formal action only by authority of the superintendent of schools. In Greater Boston the principal's activity is confined largely to making recommendations to superior officers of the school board. In the South the principal shapes the policy and guides the work of the mathematical department.

With two exceptions, and these in the case of smaller schools, the mathematical departments are organized with a head who is nominated usually by the principal, approved by the superintendent and elected by the school board. In one school, the Cambridge (Mass.) Girls' High School, the head is chosen by the teachers of the mathematical department. A typical method of management is outlined in the report of the Reading Girls' High School: "Departmental meetings are held once a week; methods, plans, etc., are discussed; class work is kept parallel; representative papers of students are submitted to and approved by the head of the department."

In the Philadelphia High School for Girls the departmental management is described as follows:

We hold departmental meetings once a month for teachers of the upper classes. At these meetings we discuss the textbooks to be used, the eliminations to be made from the texts we are using, the ground to be covered in a given time (not as a rule less than 15 weeks), the examinations to be given at the end of the half year, the needs of the classes as determined by the maturity of the pupils and by their previous preparation; often the needs of some special individuals. * * *

The head of the department, having but three classes each day, finds time to visit the other classrooms, and, especially in the case of the younger members of the department, to regulate the teaching, partly by suggestion and sometimes by taking charge of the lesson.

Once during each half year we try to have a simultaneous test for the pupils taking first-year algebra and one for those taking first-year geometry. * * * The head of the department assumes the responsibility for all pupils promoted with conditions in mathematics, planning their work for them * * * to enable them to remove the conditions as speedily and successfully as possible.

In nine schools, the teachers of mathematics, excepting the departmental head, are required to teach other subjects in order to fill out their personal programs. In three schools the work of mathematics teachers is confined, in the main, to mathematical subjects.

The schools are practically unanimous in failing to require supervision of athletics, journalism, or pupils' organizations from teachers of mathematics, but in the matter of clerical work they are about evenly divided in practice, about half of the schools requiring clerical service from the mathematics teachers.

In four of the schools an attempt has been made to cooperate with other schools in furthering special aims of pupils. The Philadelphia Girls' High School makes special provision, at the end of two years from entrance, for the transfer of girls, whose aims are thereby furthered, to technical schools. The Girls' High Schools and the Girls' Latin School of Boston transfer and receive pupils with great freedom whenever such change ministers to the vocational or college preparatory needs of the pupil.

Attempts to influence the mathematical instruction in the elementary schools are made by four of the Girls' High Schools. This influence is exerted in two ways—through mathematical associations and through the personal affiliations of teachers. The graduates of the Philadelphia High School for Girls, for example, go in large numbers to the Normal School and later become elementary-school teachers. By personal affiliations with these teachers the mathematical department of the Girls' High School of Philadelphia is able to bring considerable influence to bear upon the teaching of mathematics in the elementary schools of Philadelphia.

Exactly half of the schools report that the mathematical teaching in them is affected by the higher educational institutions. The influence thus exerted comes through the admission requirements of the normal schools, colleges, and technical schools; and through the mutual efforts of college and high-school instructors in mathematical associations and committee work. Seven of the schools are represented in such associations and six of these report that such membership has resulted in a helpful and stimulating influence on the mathematics teaching of the school.

The average age of pupils entering the schools for the first time varied from 13 to 17 years. In two schools the average was 13 years; in six, 14 years; in three, 15 years; and in one southern school 17 years. The time required for graduation is the standard four years of the regular secondary course. In the Boston Girls' Latin School a six years' course is offered, the first two years of which receive pupils who would otherwise be pursuing the two final years of the elementary-school course. The mathematical course, as a rule, covers the entire

four years, either as a required or as an elective. In four of the schools only the course is limited to three years.

Eight years is the normal time allowance assigned to the elementary course that precedes admission to the secondary-school course, though in two of the southern schools seven years only are required.

No race restriction whatever is imposed upon candidates for admission to the schools of the Northern and Middle States, but in the Southern States none but white girls are accepted for membership.

Promotions in four of the schools are semiannual, in the remainder annual; in five schools pupils are promoted by class, in four by subject, and in two by both methods.

The number of pupils registered in the schools under investigation varied from 135 to 3,629. In the 12 schools there were a total of 14,650 pupils, an average of 1,221 to each school. Reports of the per cent of pupils in the school taking mathematics of the several years were incomplete. The summary of the southern group gives the following averages: First year, 65 per cent; second year, 20 per cent; third year, 15 per cent; fourth year, 5 per cent. For the Middle States the following average is given: First year, 42 per cent; second year, 27 per cent; third year, 15 per cent; fourth year, 5 per cent for one school and 1 per cent for another school. In the Boston Girls' Latin School the full mathematical course is required from all the pupils in each year of the course.

The percentage of the total membership of the school made up of graduates varied from 3.5 per cent to 23 per cent. The average percentage of the schools reporting on this point was 13 per cent.

MATHEMATICAL CURRICULUM.

In six of the schools the mathematical curriculum is affected by the admission requirements of higher institutions; it is prescribed in the case of 10 schools by school-board courses of study, which are prepared in the case of 6 of them with the constructive assistance of the principal, acting in consultation with the head of the mathematical department. In general the means of modifying the mathematical curriculum are the same as those by which that curriculum is originally determined. The same machinery must be set in motion for revision that was employed for organization and construction. In eight of the schools an attempt is made to correlate instruction among the several branches of the mathematical curriculum. No general statement of the method employed is possible, since in all schools the correlation is informal and depends for effectiveness very largely upon the individual teacher. The subjects are taught, generally, as separate branches, but the materials furnished by one subject are employed in another. This is increasingly true of the use of applied problems, which are drawn from all the available sources.

In eight of the schools a serious effort is made to correlate the mathematical instruction with that of the naturally allied branches of science and drawing. This correlation appears principally in the use of applied problems from physics and chemistry and in special instruction in those topics of the mathematical course most fundamental to the study of these sciences. The best developed plan reported was that in use at the Reading High School, which has worked out a scheme somewhat in detail, from which the following is quoted:

Mathematics is correlated with the study of science in this school, but more especially as regards chemistry and physics. Problems in chemistry, given from time to time throughout the course, require the student's ability to make and solve simple algebraic equations. The college preparatory physics course presupposes a thorough grasp of algebra and plane geometry in order to understand the forming of the various formulæ. Continual use is also made of this knowledge in solving numerous problems throughout the course.

MATHEMATICS.

DRAWING.

The relation of numbers.....	applied in æsthetic drawing to the size used for a study.
Fractional division.....	for copying in reduced or enlarged form, and for size of component parts.
Proportion.....	used in reference to relation light and dark, or color; to proportion the size and color for distant objects.
Proportion.....	is taught in industrial drawing to emphasize fitness of size and shape for its purpose of use; for weight and tone of units in design; space relation in reference to the distribution of the finished design.
Proportion.....	used in mechanical and geometric work; required in the instruction for working drawings of geometric solids, etc.
Problems in mensuration applied to surfaces.....	used in circular work, and conic sections.
Do	used to determine the amount of material for making models.

Generally speaking, admission to a course in any other subject does not depend upon the completion of a given course in mathematics, except in so far as failure to pass in a mathematical subject would result in the loss of promotion to the next higher class. Courses are often so arranged that in order to take up a particular subject, such as physics, a pupil must have reached a specified upper class and hence must have completed a certain amount of mathematics. In this sense only is admission to a non-mathematical subject conditioned upon the completion of a course in mathematics.

In 75 per cent of the schools the mathematical course is progressive, in the sense that a given course of mathematics must have been completed as a condition precedent to a pupil's admission to the course of a subsequent year.

The following outline of a mathematical course submitted by the High School for Girls of Reading, Pa., is typical of the courses offered

by the best schools and is complete for all the subjects offered in the secondary school mathematical courses for this group:

ARITHMETIC.

Denominate numbers.

Percentage.

Simple percentage.

Profit and loss.

Trade discount.

Interest.

Simple.

Accurate.

Compound.

Bank discount.

Taxes.

Duties.

Insurance.

Ratio.

Proportion.

Partnership.

Involution.

Evolution.

Mensuration.

Metric system.

Greatest common divisor.

Least common multiple.

Review principles preparatory to study of algebra.

Pupils are expected to solve practical problems in any one of these subjects.

ALGEBRA.

Four fundamental operations.

Factoring.

Highest common factor. Least common multiple.

Fractions.

Linear equations: Numerical, literal.

Problems depending on linear equations of one or more unknown quantities.

Graphic solutions.

Radicals, including square and cube root.

Exponents, fractional and negative.

Quadratic equations: Numerical, literal.

Problems depending on quadratic equations.

Binomial theorem for positive integral exponents.

The formulas for the n th term, and the sum of the terms of arithmetic and geometric progressions with applications.

Throughout the course pupils are required to solve numerous problems which involve putting questions into equations. Some of these problems are chosen from mensuration, from physics, and from commercial and everyday life.

PLANE GEOMETRY.

The theorems and about 200 original exercises are studied. Special stress is laid upon construction work. About two weeks time is spent on the theory of limits. Locus problems are made interesting to the pupil, who is given frequent opportunity of applying *all* the geometric principles taught and of working out demonstrations for himself. The work is done *very* slowly at first, and but one-third of the course is covered the first term.

SOLID GEOMETRY.

The theorems and constructions of the text are studied. The solution of numerous original exercises, including locus problems, is required.

TRIGONOMETRY.

Definitions and relations of the six trigonometric functions as ratios; circular measurement of angles. Proofs of formulas, particularly for the sine and cosine and tangent of the sum and difference of two angles, of the double angle, and the half angle, the product expressions for the sum or the difference of two sines or of two cosines, etc. Solution of trigonometric equations of a simple character. Theory and use of logarithms. The solution of right and oblique triangles and practical applications.

EXAMINATIONS.

In eight of the schools examinations in mathematical subjects (mainly arithmetic) are required for admission. In practically all of the schools mathematical examinations are required for graduates who are candidates for admission to higher institutions. Many of these institutions, of course, will receive candidates on certificates of proficiency furnished by the school. Noncertificated pupils are in all cases subjected to examination. The schools are substantially unanimous in the opinion that these several classes of examinations have a beneficial effect both on the teaching of mathematics and on the pupil's attitude toward the subject. As one teacher puts it: "The effect is toward thoroughness and accuracy in work. The average student dislikes examinations but examinations do not make the student dislike mathematics."

In three schools only have important recent changes in the department of examinations been introduced. Such changes have been in the direction of exemption of pupils with a high term average from final examinations and the increase of weight given to the recitation mark over the examination record. The system of exemption from final examinations by schools and the substitution of certificates for examinations by the higher institutions are the chief proposals made for the elimination of the various kinds of examinations now in vogue. They have proved satisfactory where adopted and furnish an indication of the growing tendency to place less emphasis on the value of the single formal test furnished by the examination and to give greater weight to a continuous record covering an extended period.

METHODS OF TEACHING.

Under this heading the attempt was made to determine whether each of 12 specified methods was in use in the school making the report and also, irrespective of its adoption, whether the person making the report considered that method educationally desirable. These replies will be considered in detail, as follows:

The "laboratory method" was in use to a limited extent in a little more than one-half of the schools and was considered desirable by

more than one-half. The "heuristic method" and the "individual method" were in use in exactly one-half of the schools and were considered educationally desirable by seven schools. Little interest was manifested in the discussion of "paper folding" or "outdoor work," only two schools reporting these methods as in use and only three expressing the opinion that they were of value in teaching. Most of the schools employed models and felt that their use was justified by the results. Seven schools made use of "measurement and computation," and of "cross-section paper," while only one school preceded the study of formal deductive geometry, by "observational" geometry, although five of the schools believed this precedence to be educationally sound. Six schools teach "algebra and geometry" somewhat in combination, though in a purely informal manner and under the separate captions of algebra and geometry. Three replies indicate a similar treatment of "plane and solid geometry" and of "geometry and trigonometry."

Opinions expressed in the replies varied as to the "stage of the pupil's progress at which the emphasis should be placed upon grasp of logical relations rather than upon manipulative skill," from 10 years of age to 15 years of age. The majority of the replies, however, leaned to the ninth or the tenth school year, indicating that this transfer of emphasis should be made during either the first or the second high-school year.

The basis for marking mathematical work appeared to be as follows: All the schools mark on recitations made orally in class; only three give any considerable weight to written home work, whereas all schools make written class work an important element in determining the pupil's rank; eight schools allow credit for voluntary original work; four give weight to the teacher's general estimate of the pupil's power and accomplishment, and all the replies indicate that examinations furnish at least a partial basis in the final rank, such examinations occurring either at stated intervals or at the term's end.

Reports of the percentage of failures in mathematics from various causes varied from "percentage of final failures almost 0" to 30 per cent. The average of failures reported was 13 per cent.

While only two schools reported methods of marking from which it was possible to determine a pupil's proficiency in such details as "numerical accuracy," "algebraic manipulation," "knowledge of geometrical facts," "comprehension of logical dependence," and "mathematical ingenuity," five schools considered such a method of marking desirable. Six schools, however, were opposed to such a system and only one school came forward with a suggestion in any way practicable for registering such records of capacity, in the detail indicated by the questions. This suggestion was an outline of the

method employed by teachers in making their class reports in that high school. "Each teacher makes a report of her classes six times a year, in which she specifies whether one of the five items mentioned in which proficiency may be shown or indifference is responsible for each pupil's failure."

In six of the schools there were available for use, or the pupils had access to, collections of mathematical instruments, models, and devices for mathematical instruction. The most notable of such collections is that of the Teachers College of Columbia University, New York City.

AIMS OF TEACHING.

In their mathematical teaching, all the schools aim at culture, as not being inconsistent with the special purposes which the school was designed to serve. Nine of the schools were either wholly or in part preparatory for college and three fitted for technical or normal schools.

In the six occupations listed under "vocational aims" one school gave preparation for the occupation of "draftsman;" two for that of computer; and five for that of accountant or merchant. There were no girls' schools that gave training for the professions of surveyor or civil or mechanical engineering. In addition to the aims classified three schools directed their mathematical training toward the equipment of the teacher of mathematics.

SUBCOMMITTEE 3. COEDUCATIONAL HIGH SCHOOLS IN THE EAST.

The questionnaire sent out by the Bureau of Education, at Washington, for this committee, met with a most generous response. The teachers of the secondary schools in the Northern Atlantic States—including Maryland—cooperated most heartily, and several hundred replies were received by the chairman. So many and so varied were these that a serious difficulty arose concerning the collating of the information there recorded. The district assigned to the committee was divided into sections, and the replies from a section given to each member of the committee for investigation. The committee worked for many weeks compiling a statistical report which was sent by the chairman to the chairman of the general committee on public general secondary schools, to be incorporated in the final report. To make a statistical report is fairly easy, but when it comes to giving a summary in essay form, it is almost impossible to do the subject justice. The fact that the answers to the questionnaire have been so many and so varied, and given by so many different individuals, who, of necessity, often have considered the questions from

a narrow point of view, makes it unwise to attempt to collate this large mass of material in a scientific way. While the reports of all the members of this committee were excellent, the one by Miss Mary Gould, of the Roxbury (Mass.) High School, covers so well the conditions existing in all the district, that the chairman has incorporated it below in this report.

REPORT OF MISS MARY GOULD, OF ROXBURY (MASS.) HIGH SCHOOL.

The following report is based on data sent by teachers of mathematics in the general secondary schools in the district assigned to the committee. As the number of pupils in schools sending answers to questionnaires varies from 32 to 2,380, and the conditions differ widely, we shall attempt to give only the consensus of opinion expressed regarding:

- a. The organization,
- b. The mathematical curriculum,
- c. Examinations,
- d. Methods of teaching,
- e. Aims of mathematical teaching.

The mathematics department in schools where there are several teachers of the subject is usually organized under a head, who is responsible to the principal. While the committee, superintendent, and principal have full power to regulate the instructions of all schools in the vicinity, the curriculum and methods of instruction are seldom changed except at the request of those actually engaged in the work.

In the lowest class, committees of teachers selected by the head of the department set the limit to be reached by all divisions of the class from week to week, prepare uniform tests, state which topics are to be omitted and which are to be elaborated more or less fully than the text. Within these limits, each teacher has freedom of methods. In the second and third classes the same outline is followed but with greater freedom. In the highest class the work is usually in the hands of one teacher and there is little or no restriction.

On the teaching staff of the department there is usually at least one who teaches only mathematics, but there are others who teach other subjects also, often science, sometimes English, foreign languages, or history. In the larger schools little or no outside work in the supervision of athletics, journalism, or pupils' organizations is expected of a teacher, although in most cases they have the work which a session room entails.

Most cities and towns in this region have but one secondary school, so that contact with other teachers and cooperation with them comes mainly through mathematical associations. By discussions carried on at the meetings of such associations the college indirectly influences the methods of presenting mathematics at the secondary schools. We regret that the secondary schools do not in their turn help the elementary teacher.

Boys and girls are sent to a secondary school after an eight or nine year course in the grades, at about 15 years of age, to take a four-years' course (some schools give a three-years' commercial course). They are usually obliged to take algebra and geometry in the first and the second years respectively; college students are required to continue a third, and in some cases a fourth, year study of mathematics. Promotion comes annually by class, about 10 to 15 per cent graduating each year.

The curriculum of the mathematics department is largely determined by the object which the school has in view; in the college preparatory courses the college admission requirements mold the course; in the general and commercial courses, the school board and principal prescribe such studies and textbooks as seem to lead toward the ultimate purpose of the pupil. Teachers may, on the recommendation of the principal, modify the requirements by application to the school board. Although correlation of the different branches is not highly developed, there is a tendency to make

mathematics a progressive subject, and to correlate it with physics, chemistry, and mechanical drawing.

In running through the curriculum of this department, we shall omit an outline of arithmetic as it is taught first in the grammar grades.

In algebra the order of the topics is:

First year work.

Fundamental notions and operations, removing and insertion of parenthesis, simple equations without fractions; symbolic expressions preparatory to problems, solution of problems leading to equations of first degree without fractions; factoring (usual cases), highest common factor, including cases which can not be done by factoring; lowest common multiple, including some unfactorable cases; reduction, addition, subtraction, multiplication, and division of fractions, complex fractions of medium difficulty, solution of numerical and literal equations of the first degree containing fractions, problems leading to such equations; simultaneous equations in two and three unknowns (three usual methods of elimination), both numerical and literal, problems leading to simultaneous equations. Powers and roots of monomials, squares, cubes, and a few higher powers of binomials, square root of polynomials and of numbers. Theory of exponents, simple cases, without formal proof of the laws of exponents, surds, addition, subtraction, multiplication, and division of surds, omitting complicated cases; harder problems than before leading to equations of the first degree. Pure and affected quadratics, completion of the square and solution by factoring. Numerical quadratic equations and some simple literal ones. Some of the simpler cases of simultaneous quadratic equations. Problems leading to all kinds of quadratics studied. Graphs and graphical methods are used to some extent. The aim in this course is skill in manipulation, and not primarily to develop logical power.

Geometry, second year work.

The usual amount of plane geometry, theorems, constructions, and computations. In the prescribed course, only the simplest originals, theorems, and constructions are required, but a considerable number of numerical examples based upon theorems proved are required. The subjects of loci, incommensurables, and variables are very briefly handled.

In the elective (college preparatory) course a much larger number of originals (500 to 600), both theorems and constructions, is required. Loci, incommensurables, and variables are required and are fully treated. In this year four periods weekly of prepared lessons and one unprepared lesson are given.

In third school year, plane geometry is reviewed for half the year by college preparatory students, and greater attention is paid to originals, loci, variables. The usual amount of solid geometry (including elementary spherics) with exercises is followed for half a year, by those preparing for scientific or technical schools.

The course in geometry just described is the one usually followed in the larger schools, but the committee is not willing to say that it is the universal course; in most schools, however, geometry is taught either for two whole years, or for parts of two years. The periods per week are usually three hours if the two whole years are taken in preparation. It is very hard to get a course which would even approximate a universal one in this subject, because the methods and the time of preparation vary exceedingly in the different schools.

In the third year all college preparatory students have one-half year of algebra, five periods a week. The work of the first-year algebra is reviewed, but the harder examples omitted on first reading are mostly done, and the following new subjects are taken up: Theory of exponents and surds completed. The demonstrations of the laws of operation now required. Interpretation of negative, infinite, and zero results and simple indeterminate forms, imaginaries, harder literal quadratics and simultaneous quadratics (all the principal methods of solution), theory of quadratics, remainder and factor theorem, ratio, proportion, progressions, binomial theorem for positive integers (proof by mathematical induction required), simple inequalities.

In fourth year for half the year the following subjects are taken: Permutations and combinations, method of indeterminate coefficients, resolving into partial fractions, binomial theorem for negative and fractional exponents, plotting of equations and graphs, and theory of equations (the usual amount), including transformation, Sturm's theorem, and Homer's method of solving numerical equations of higher degrees.

In fourth year (second half) the usual amount of plane trigonometry, including solution of trigonometrical equations, solution of right and oblique triangles, applications to concrete problems, use of logarithms and tables.

Teachers agree that examinations produce uniformity in work and prevent marked divergence in the instruction. Tests are required for admission, and for graduation as well as during the course.

In development of the subject a teacher is allowed to use any method that brings results; at times teachers use the laboratory, heuristic, or individual methods; they find museums, colored crayons, measurement, and computation, paper folding, models, and cross-section paper helpful. To some extent algebra is combined with geometry; solid with plane geometry; and geometry with trigonometry.

Observational geometry should precede deductive geometry, but seldom does; and outdoor work in mathematics is decidedly in its infancy.

After the pupil has attained some degree of skill in manipulation from his first year's work in algebra, emphasis is placed on the logical relations found in deductive geometry and increasingly thereafter in his continuation of algebra. The teacher judges of the pupil's progress by his oral recitations, written home work, written class work, and voluntary original work. A greater per cent fail than in any other subject, estimates from 10 to 25 per cent being sent in. While it is desirable to estimate separately the pupil's measure of proficiency in numerical accuracy, algebraic manipulation, knowledge of geometric facts, comprehension of successive logical dependence, and mathematical invention and ingenuity, no system of marking has yet been devised recording such estimates.

Most schools have a hierarchy of aims in their mathematics course; the instruction strives to promote general culture, to prepare for college, or technical school, or if the pupil is to go out into the world immediately, to suggest the occupation of homemaker, civil or mechanical engineer, surveyor, draftsman, computer, merchant, or skilled worker in various local manufactures.

Two topics have been considered by the committee, which were not on the questionnaire: (1) the advisability of separating the girls and boys in the mathematics classes; and (2) the ability of the girls as compared to that of the boys.

There seems to be no general movement to make such a segregation of sexes in mathematical classes, although it is almost unanimously believed that such a step would be advisable in certain grades of the work. In the schools where a large number of boys are preparing to enter the higher technical schools, the classes in higher mathematics are composed entirely of boys, and much better work is being done than in the corresponding mixed classes. Even in the elementary subjects it has been found in such schools that better results are obtained if the segregation takes place early in the course. However, a strong objection to this scheme has been made by some members of the committee. It seems to be the general opinion that the average boy shows more ability in mathematics than the average girl, but also that he does not work so faithfully. In a mixed class this greater ability of the boy, and the greater faithfulness of the girl, react most advantageously on each other. This question of the difference in ability of the girl and the boy is a many-sided one. Every teacher in a mixed school has found in the mathematics class many girls who could do the work as well as the boy, and who by steady application to work has obtained a higher mark than he. But the average girl meets the situation at the start with a prejudice "*ex matre*," and is

therefore handicapped. Another fact that is noted is this: In elementary algebra the girl does as good work as the boy; in geometry not nearly so good. In advanced algebra and trigonometry, the boy shows an ability which is far ahead of the girl. Yet, we are free to confess that his greater natural ability is often outclassed by the steady, patient endeavor of the girl. Perhaps it would be safer to say that the girl does not show as great an ability as the boy, even though she may have it.

The committee finds from the replies which were sent in that the conditions are still somewhat chaotic in many schools—a lack of organization; crowded curricula; the teaching of algebra and geometry by many teachers who have neither liking for the subjects nor ability to teach them; the use of poorly prepared text books; and usually the use of methods which are mechanical and ill-adapted to the needs of the present generation of secondary school students. An honest effort is being made in many schools to reform these conditions, and the committee sees signs of a coming era of saner methods, of better departmental work, and of closer correlation of subjects pertaining to mathematics.

SUBCOMMITTEE 4. COEDUCATIONAL HIGH SCHOOLS IN THE MIDDLE WEST.

INTRODUCTION.

Source of data.—In preparing this report the committee has secured data from a number of sources. Reports of various mathematical associations and of boards of education and magazine articles have furnished a great deal of material. Some of the information has been secured by correspondence. The main source of information, however, has been the questionnaire sent out by the United States Bureau of Education. This questionnaire was sent to every high school in the Middle West.¹ About 600 replies were received by the chairman. These replies were sent to each member of the committee, who examined them carefully for data on one or more points of the report. The results of this examination, together with matter secured from other sources, are presented in the following statement.

ORGANIZATION.

Departments.—Except in the high schools of large cities the mathematics can not be said to be organized into departments. Like the other subjects, it receives the attention made possible by the size of the teaching force. If this teaching force is small, mathematics is taught by those who have other subjects also. In the large high

¹ The "Middle West" was regarded as including the States of Ohio, Indiana, Michigan, Illinois, Wisconsin, Missouri, Iowa, Minnesota, Kansas, Nebraska, North Dakota, and South Dakota.

schools a better organization is found. One or more teachers give their entire time and energy to the teaching of mathematics, and thus the "department" of mathematics is formed.

About one-fifth of the replies to the questionnaires state that the schools have the work in mathematics organized into departments. The department heads are appointed in some cases by the board of education, in others by the superintendent or principal. The position is sometimes held by the right of seniority. No special rule determines the method of appointment; it usually depends on the wish of those interested.

The head of the department.—The duties of the head of the department vary. In some schools he has charge of the organization of the mathematics courses and must see that the teachers in the department effectively present the different subjects. He calls meetings of the teachers of the department, presides therein, and, subject to the control of the superintendent and principal, he is in a general way responsible for the work of the department.

In other schools he is considered a responsible person on whom the superintendent or principal depends to carry out his general policy or some detail which concerns the department as a whole, but he is not responsible for the organization and has nothing to do with the class work of other teachers, the superintendent or principal keeping direct control of that phase of the work. The greater number of organizations are of this type.

Teaching other subjects.—Three teachers of mathematics out of every five teach other subjects also. About 20 per cent have to do with athletics and one-half that number are required to do clerical work. In many of the smaller schools the mathematics is taught by the superintendent, who must divide his energies between class work and school supervision.

Transfer of pupils.—Chicago, Cleveland, Cincinnati, and Indianapolis are the principal places reporting the organization of the subjects to be such as to require the pupils to be transferred from one school district to another. Cleveland, for instance, has a number of high schools. These high schools do not offer the same courses. A pupil in one district, wishing to take a certain line of work, may have to be transferred to the high school of another district, as the one in his neighborhood may not offer the desired course. On the other hand, St. Louis offers the same courses in each high school and, consequently, there is no reason for transfers. This is true of most cities having more than one high school.

Relation between mathematics in the high school and in the grades.—High-school mathematics is most closely articulated with the mathematics of the grades in the smaller schools. In these places, especially if the superintendent has charge of the mathematics classes,

the connection is close and the bearing of one on the other is marked. In the larger schools the connection is not so noticeable. While the course of study is arranged in sequence, and promotions are made on basis of the pupil's ability to do the high-school work, there is nothing more. The high-school teacher of mathematics has nothing to do with the instruction of that subject in the grades. With some exceptions, he knows little or nothing of the pupil until he is enrolled in his class. About 50 (mostly superintendents teaching mathematics classes) report that they have direct influence on the grade work. About 100 state that their influence is indirect; the remainder, that they have no influence.

Determination of what is to be taught.—With few exceptions the university requirements regulate the mathematics taught in the high school. In some States the State board regulates, while in others the State superintendent has such authority. Naturally the relations between the university and the high school are not as close as between the high school and the grades. The university generally states the minimum amount of work of good quality which will secure admission for the high-school graduate.

Relations of the universities and the high schools.—The leading universities have at least one conference a year with the representatives of their affiliated schools. At these conferences mathematics sections discuss subjects from the standpoint of the university and from the standpoint of the high school. In many cases joint committees are appointed to make reports. In this way the two institutions understand each other better than formerly. As a consequence there has been a helpful modification on the part of each. The high school realizes more and more that it, as well as the university, is entitled to an effective part in the decision of the common questions of school life. At one time the university expected the high school to adapt itself to university requirements; now the leading universities do not hesitate to adapt themselves to the needs of the high school.

Associations of teachers of mathematics.—There are three kinds of associations of teachers of mathematics—the sections in the conferences of affiliated schools, the sections in the State associations of teachers, and the associations independent of other organizations. The first has been described, the second is similar to it; it will be sufficient to mention one of the third.

The Central Association of Science and Mathematics Teachers is the main organization that has influenced the teaching of mathematics in the Middle West. Its members are found in all the States covered by this report. It began under its present name in 1902. Specially appointed committees have prepared reports on the different topics in secondary mathematics, and those reports have been widely

distributed. They have had a marked influence on the high-school courses. Reference to the work of these committees is made in another part of this report.

The above influences have been partly the cause and partly the result of the activity on the part of the teachers in the Middle West in breaking away from the traditional lines in mathematics teaching. This activity is more or less manifest in all parts of the United States, but probably in no place as much so as in this district.

Miscellaneous statistics.—The high-school pupil enters at 14 years of age. He has had eight years in the grades, which may have been preceded by another in the kindergarten. Four years in the high school are necessary for graduation.

Twenty-five per cent of the reports state that four years of mathematics are offered, 40 per cent three years, and the remainder from one to two and one-half years. Where the schools are large enough there are different courses, some of which may require four years, others only one.

The percentage of the pupils entering that grade varies greatly. The minimum is 1.5 per cent; the maximum 62. The greater part is from 12 to 25 per cent.

No racial restriction of pupils is made except in a few places near Mason and Dixon's line.¹

In 55 per cent of the schools annual promotions are reported; in 45 per cent semiannual promotions; 25 per cent report promotion by classes; 75 per cent promotion by subjects. In nearly every school mathematics is required in the first and second years; in the third year a number offer electives; 118 report no mathematics in the fourth year; 44 report that other mathematical subjects, as commercial arithmetic, mathematics for artisans, etc., are required.

THE MATHEMATICAL CURRICULUM.

Determination of the curriculum.—As a matter of fact, the university is the most influential factor in the determination of the curriculum. Each university or college sets up its own entrance requirements and admits graduates from high schools whose work meets these requirements, and the high school that wishes to stand well tries to conform to the standard so set up. The main outlines of the curriculum being thus virtually fixed, the superintendent, principal, or head of the department arranges the details of the course, and, finally, the school board must give its stamp of approval.

Various modifications may be made, such as the introduction of mathematics suited to a commercial course or to manual training. Such modifications are usually introduced by the school authorities

¹ The parallel of latitude 39° 43' N., famous in history as the boundary line between the former slaveholding States and the others.

acting upon the recommendation of members of the department of mathematics.

The subjects taught.—In general, the courses consist of arithmetic, algebra, and geometry, and a few schools offer trigonometry and advanced algebra. In most places these branches are not correlated or taught simultaneously, but the prescribed amount of work in one branch is completed before another is studied. Correlated work is, however, to be found in many places. Some of the schools in the Middle West have been especially aggressive in this respect. Reference will be made to them later in the report. Attempts have also been made to correlate with physics. Manual-training schools have introduced courses in mathematics, which it is believed will be more helpful to their pupils than those usually prescribed, and commercial schools are making the same experiment.

Promotion of pupils.—Nearly all the high schools base the work of any one term on the satisfactory completion of the prescribed work of the preceding term. If his work in mathematics is satisfactory, the pupil is permitted to take the next term regardless of his success in other subjects. This marks a decided advance over the condition which existed a few years ago, when the pupil was compelled to repeat his work in all subjects, if he failed in one. As a rule admission to other subjects does not depend on mathematics in any case except physics, chemistry, mechanical drawing, and machine-shop work.

The scope of the courses.—The courses in algebra, geometry, trigonometry, and arithmetic are usually in close conformity with the current textbooks. There are, however, some variations from this, since in most cases teachers are at liberty to use discretion as to the order and emphasis of topics. As has been stated, attempts have been made to break away from the traditional order of things, and these attempts have furnished many topics for discussion before the mathematical organizations. These discussions, in turn, have resulted in some modifications, but it is too soon to make definite statements as to the outcome. It is sufficient for the purposes of this report to mention the existence of such a movement and to give in the sequel its main characteristics.

(a) Algebra.

Scope of the customary course.—Most of the high schools give a course in algebra such as is presented in the well-known current textbooks. The details of this course need not be discussed here; but it will be sufficient to refer the reader desiring further information to these textbooks.

Modifications proposed.—The Middle West has been especially active during the last three years in discussing modifications of the algebra courses. A number of reports have been made and the fol-

lowing statement is intended to be general enough to include their main points:

The work in high-school algebra should consist of an elementary course given during the first year and a more advanced course given not earlier than the third year, after demonstrational geometry. The first year should train pupils in the solution of problems by means of the equation, rather than exercise them in abstract manipulation. The later course, covering at least one half year, should include the demonstrational work and all topics usually given in elementary algebra. The kind of manipulation necessary for advanced work in mathematics is best emphasized in this course.

Proposed omissions.—In consequence of the central idea proposed for the first year, certain of the topics usually given should be omitted and the order of those retained should be changed. It has been suggested that the following topics be omitted in the first year:

Complicated brackets.
H. C. D. and L. C. M. by division.
Remainder theorem.
Complicated complex fractions.
Simultaneous equations in more than three unknowns.
Binomial theorem.
Cube root of polynomials.
Formal study of the theory of exponents.
Extended study and manipulation of radicals and imaginaries.
Equations containing complicated radicals.
Simultaneous quadratics except one linear and one quadratic.
Theory of quadratics.

A proposed order of topics.—The following order of development of topics has been suggested:

Additional problems; equations; abstract addition.
Subtraction; transposition in equations; numerical equations; simultaneous equations (simple); elimination by addition and subtraction; abstract subtraction; simple brackets.
Multiplication and division taught together; complicated problems in long division may be deferred till later; equations involving multiplication; easy fractions and fractional equations (monomial denominators); easy involutions; simultaneous equations (other methods of elimination).
Special cases of multiplication with easy factoring.
Solution of quadratics by factoring.
Roots and radicals.
Pure quadratics; affected quadratics by completing the square; simultaneous equations involving one quadratic and one linear.
Multiples and common divisors by the factoring method; addition and subtraction of fractions.
Multiplication and division of fractions; easy complex fractions.
Harder fractional equations; verification of roots.

Character of the problems.—Problems should have a concrete setting; they should be valuable and come within the scope of the pupil's experience; they should be abundant and, as far as possible, be introduced with each topic studied; they should be classified according to subject matter, and most carefully selected and graded. It is particu-

larly necessary that such problems be carefully graded beginning with the simplest, and that elementary conditions be comprehended.

The second course.—The later course should look upon algebra as a study of functions, and the various topics should be treated from this point of view. This course prepares for college, and need not be taken by pupils who plan to stop study after graduation from the high school.¹

(b) Geometry.

Scope of the customary course.—Most high schools give a course in geometry such as is found in the well-known current textbooks, to which the reader is referred for details of the course.

Modifications proposed.—The modifications proposed in geometry have not been as extensive or as radical as those proposed in algebra. A study of the various reports shows that the following points have been considered and strongly recommended.

The introduction should be a course in construction. This is to familiarize the pupil with geometrical ideas and, for the time being, no attempt should be made to develop the formal logical processes.

“A free use of assumptions is recommended, yet it is essential that all propositions used explicitly in a formal demonstration be recognized as either previously proved or as belonging to the list deliberately left unproved.” Rigorous proofs should not be demanded at the beginning. This does not mean that the demonstration should be a loose one; but rather that the exactness which is usually required in the beginning shall be recognized as a matter of growth and a result of later work.

Such propositions as “All straight angles are congruent,” “All right angles are equal,” “Circles having equal radii are congruent,” should not be demonstrated, as is usually attempted at the beginning of a course. It is sufficient to regard them as direct inferences.

Propositions should be omitted which are obvious, too difficult, or unusual. List of omissions: Square of side opposite acute angle, square of side opposite obtuse angle, division in extreme and mean ratio, inscribed decagon, symmetry, theorems on limits, incommensurable cases, maxima and minima, sum of squares of two sides equal to twice the square of half the third side increased, etc., difference of the squares of two sides, etc., in any triangle the product of two sides equals the diameter of the circum-circle multiplied by, etc.

These omissions give opportunity for emphasizing such topics as “congruence of triangles, similarity of triangles, Pythagorean theorem, properties of circles, mensuration theorems concerning plane figures, properties of spheres.”²

Solid geometry.—The work in solid geometry immediately follows that in plane geometry in many schools. In others a course in

¹ The above statement on algebra is taken almost entirely from the “Proceedings of the Eighth Meeting of the Central Association of Science and Mathematics Teachers.” The committee could have quoted almost the same statements from other reports. Special mention should be made of the Illinois report, the Indiana report, and the reports from Missouri and Wisconsin.

² The quotations are from the Illinois report on geometry, 1911.

algebra is given between plane and solid geometry. In either case more emphasis is laid upon the formal deductive side than in the first year. Many teachers develop the notion of functionality by the introduction of trigonometric functions.

(c) **Mathematics.**

Character of the courses.—Some of the schools report courses in “mathematics.” This differs from the work usually given, in that arithmetic, algebra, geometry, and trigonometry are unified. The traditional barriers which have kept these subjects separated have been broken down. Other subjects, notably physics and chemistry, are made a part of this unification. The old cut and dried forms of treatment are ignored. As one report states, “If we know arithmetic, algebra, geometry, and trigonometry in their relations to one another, there will be no hesitation about introducing one subject into the teaching of another wherever such material is needed.”

The high schools at Lincoln, Nebr., Indianapolis, Ind., and Cleveland, Ohio, have been especially prominent in this line of work, the first named being a pioneer. Small schools where it is necessary to combine such departments as mathematics and physics, or to have all the mathematics taught by one teacher, are among the number reporting this plan of work. There is no uniform arrangement of subject matter in the schools teaching “mathematics.” The following statement, however, is representative:

The topics usually considered in the courses in algebra and geometry are distributed throughout the entire course on the spiral plan, the more simple and concrete ideas at first; the more complicated, difficult, and abstract ideas later. Algebra predominates in the first year, geometry in the second. Arithmetical work is carried on throughout the entire course in conjunction with other topics wherever it naturally enters. Some of the trigonometric functions may be made use of in connection with the triangle.¹

EXAMINATIONS.

Examinations for entrance to the high school.—The first year of the high school is regarded as the ninth grade of the local system of graded schools. A pupil passing the eighth grade can enter the ninth just as one passing the seventh can enter the eighth. But it is different with pupils entering from another system of schools. In that case an entrance examination is required. If the pupil is a candidate for the first year of the high school, this examination must be such as to satisfy the school authorities that he has a knowledge of the eighth-grade work; if he is a candidate for advanced standing, he must show by examination that he is worthy of advanced credit. Occasionally schools take candidates on trial. A few weeks' test in the classroom

¹ The quotations are from a report entitled “Unifying Mathematics,” in the “Proceedings of the Eighth Meeting of the Central Association of Science and Mathematics Teachers.”

will be regarded in the light of an examination. Arithmetic is one of the principal subjects in the entrance examination.

Examinations for entrance to college.—Universities do not give entrance examinations to graduates of their own accredited high schools. But if the candidate for entrance is a graduate of a high school not on the accredited list, an examination is required. The North Central Association of Colleges and Secondary Schools has brought it about that graduates from the strong high schools of this district can enter without examination any of the higher institutions of the Middle West.

Effect of examinations.—We pass next to the consideration of the following question from the questionnaire: "What is the effect of these several classes of examinations (a) on the teaching of mathematics in your school? (b) on the pupil's attitude toward the subject?"

The replies are tabulated as follows: To the first, 249 say the effect is good; 24 that it is bad; 54 say it is not noticed. To the second, 194 say the effect is good; 34 that it is bad; and 63 say that it is not noticed. It is interesting to note from these replies that more see good effects on teaching than see good effects on the pupil's attitude.

METHODS.

The methods in use.—The replies to the question concerning the methods used in teaching secondary mathematics do not always make distinction between "methods" and "devices." Those used most are the laboratory method, individual method, measurement and computation, and cross-section paper. The largest number state that they use measurement and computation. Some of the replies state that all these methods and devices were used during the year.

As already stated, a number of schools make a combination of arithmetic, algebra, geometry, and trigonometry. It is not to be inferred, however, that this combination always means correlation. It may mean the teaching of the subjects simultaneously—for example, geometry three hours in the week and algebra two.

The following special methods or schoolroom devices are taken from the reports:

1. Individual problems.
2. Have the pupils make models.
3. Find the value of π by rolling a disk on a yardstick.
4. Use colored crayons.
5. Small drawing board, T square, and triangle for each pupil.
6. Use a "composite figure" from which the pupil selects material to prove various propositions.
7. Make lantern slides from construction problems thoroughly worked out.

8. Use stereopticon.
9. Have small sections in the class.
10. Give geometrical drawings first.
11. Complete reviews should be printed on the mimeograph and distributed to each pupil.
12. Pupils should make figures in solid geometry from prepared clay and toothpicks.
13. Use equation balances.
14. Use the transit.
15. In Book VI use a large sheet of cork and knitting needles.

When logic should be emphasized.—Of the replies to the question: "At what stage in the pupil's progress should the emphasis be placed upon his grasp of logical relations rather than upon his manipulative skill?" 40 per cent state that it should be during the second year, 25 per cent the first year, 20 per cent the third year, and the remainder during the fourth year or "throughout the course." These data support the claim of teachers who believe that geometry should be given during the second year rather than the first. As has been stated, this subject is found in most of the schools after one year of algebra.

Grading.—Pupils are graded on oral recitations, written home work, written class work, voluntary class work, written examinations at stated intervals or at the end of the term, and on the teacher's general estimate of the pupil's power and achievement. Oral recitations are used by nearly everyone, as is shown by the fact that 550 stated they always considered them. Examinations, written class work, and the teacher's general estimate are favored in the order given.

Exemptions.—In many schools exemptions from examination are given; that is, if a pupil attains a specified grade, say 90, on his class work, home work, etc., he need not take the final examination.

Failures.—The percentage of pupils who fail runs from 10 to 85 per cent. No other point considered in this report presents such extremes. The greatest number of replies state that 10 per cent fail. Twenty per cent, 25 per cent, and 15 per cent occur in the order given. The replies giving 10 per cent of failures are usually from the smaller schools where the number is such that the individual pupil can be looked after more closely and the pace adapted to his ability. The large, well-organized schools, where the standards are highest, report not less than 20 per cent, the number usually being between 25 and 35 per cent.

Discriminating marks.—The questionnaire asks, "Are the methods of marking mathematics in your school so arranged that it is possible to conclude from the pupil's marks on record whether he is proficient in numerical accuracy, algebraic manipulation, knowledge of geometrical facts, comprehension of successive logical dependence, and

mathematical invention and ingenuity?" Eighty per cent report "No" and 20 per cent "Yes," though 75 per cent say such a record is desirable. Some state they include all of these points, though more emphasis is placed on one or two than on the others.

Various suggestions were made for securing such a method of marking:

1. Use of letters—

Ae, excellent in accuracy.

Mf, fair in manipulation.

2. Card system.

3. Grade 20 per cent as perfect in each.

Mathematical clubs.—Some of the large schools have mathematical clubs. The Engineering Club at the McKinley High School, St. Louis, Mo., is typical. Its membership is limited to 35, and restricted to pupils of the junior or the senior class, whose general record is good and whose interest in mathematics is such as to cause them to seek membership. One of the mathematics faculty is moderator and sees that the efforts of the members are directed along worthy lines. Committees arrange the programs and see that each one does his part. It is understood that the success or failure of the semester's work depends on the club and not on the faculty representative. So far the results have been very satisfactory.

The following are some of the topics considered during one year:

Field work—

Surveys and computations necessary for a proposed extension of a street railway line, including maps and profiles.

Surveys for a proposed extension of a city street.

Triangulation, or measurement of inaccessible distances.

Reports—

Principles of bridge building.

Gold mining.

Ice-making plant.

Electrical transmission.

Sewage disposal.

Raising of the *Maine*.

Points dealing with the construction of the new bridge, sinking of the new caissons, etc.

Efficiency of electric batteries.

Problems dealing with the aeroplane.

AIMS OF MATHEMATICS TEACHING.

Character of the replies.—The information which the committee secured from the questionnaire on the "aims of mathematics teaching" is not satisfactory. The statements were in many cases indefinite. In view of this fact it seems advisable to tabulate the replies and to make no attempt at generalizations.

The general aim.—In answer to the question "Is the aim of mathematical instruction in your school general culture?" 400 said "Yes." Three hundred and fifty state their aim is to prepare for college; 125 prepared for technical school, while 25 do not make such a preparation.

Preparation for specific occupations.—The replies to the question concerning preparation for certain specified occupations are as follows:

1. Civil engineer.....	47 yes, 29 no.
2. Surveyor.....	35 yes, 36 no.
3. Draftsman.....	31 yes, 37 no.
4. Mechanical engineer.....	47 yes, 36 no.
5. Computer.....	45 yes, 38 no.
6. Accountant or merchant.....	171 yes, 31 no.

School teaching, agriculture, housekeeping, office work, carpentering, all receive frequent mention in the answers to this question.

SUBCOMMITTEE 5. MATHEMATICS IN THE COEDUCATIONAL HIGH SCHOOLS IN THE SOUTH.

Throughout the South, as in other parts of the United States, the public high schools that are not especially designed for vocational ends, as few are, are intended to follow an elementary school course of seven or eight years. Some of the States specifically prescribe courses of study necessary for approval by the State inspector. This approval in many cases is a prerequisite for the allotment of pecuniary aid from the State treasury, or for admission to the State university or to the State normal schools.

For the purposes of this investigation a list of questions was sent to school officials and high-school principals in all parts of this region. Replies were received from 80 of the persons so addressed. So far as those replies are pertinent, the following conclusions appear.¹

ORGANIZATION.

In 61 per cent of the schools the principal has effective influence over the teaching of mathematics. In 47 per cent of the schools there is a head of the mathematics department or a special teacher of mathematics, selected in three-fourths of the cases by the school board or by the superintendent of schools, and in the other fourth by the principal. The teachers of mathematics have other subjects to teach in 59 per cent of the cases, have charge of or supervision of school athletics, journalism, or social activities in 24 per cent, and have clerical work in addition to teaching in 17 per cent.

The school is represented in associations of teachers of mathematics in 44 per cent of those replying; the effect of such associa-

¹ Percentages are of the number of schools replying to the question. Some of the questions were regretably so framed as not to elicit full replies.

tions upon the teaching in the school is in a comparatively small proportion of cases reported as beneficial.

Throughout this region separate schools are provided for whites and for negroes. In some cases the statement is squarely made that separate schools with identical courses of study are offered to the two races, but there is a clear implication that in many of the smaller communities at least the opportunities for secondary education are restricted to whites.

Promotions are annual in 76 per cent of the schools replying, semi-annual in the others; by subject in 44 per cent, by class in 56 per cent.

The percentage of the whole school membership graduating each year varies widely, as shown by the following table:

Number of schools reporting.	Per cent of pupils graduated.
9.....	0 to 5.
21.....	6 to 10.
23.....	11 to 15.
13.....	16 to 20.
2.....	20 or more.

THE MATHEMATICS CURRICULUM.

Course.—The course of mathematics in 87 per cent is determined by the admission requirements of higher institutions. Decisive action is in all cases taken by the school board; the principal is an influential adviser in 82 per cent and the head or special teacher of mathematics in 71 per cent.

The different branches of mathematics are correlated with each other in 70 per cent, and the successive years of mathematics are dependent on the previous years' work in 96 per cent. (The replies to the former question undoubtedly indicate a higher degree of correlation than actually exists among the different branches of the study. The meaning of the question does not seem to have been clear.)

Some correlation is found between mathematics and physics in 58 per cent, and success in the algebra course at least is insisted upon for admission to the study of physics in 32 per cent.

Content of the curriculum.—Half a year of arithmetic is given in 80 per cent, and an additional half year in a few others, say 3 per cent. Algebra is given for a year at least in all the schools, for a year and a half at least in 40 per cent, for two years in 21 per cent, and for two and a half years in 3 per cent. Arithmetic is given after algebra, either as review or as "higher arithmetic" in 14 per cent. "Higher arithmetic" as used here means evidently more involved problems and commercial applications of the same principles that are treated of in ordinary arithmetic, with the occasional addition of such topics as mensuration and square root. There is no indication of any consideration of the relative accuracy of data, of the number of sig-

nificant figures as indicating the degree of approximation, or of any use of logarithms or the slide rule as an adjunct of the arithmetic work so-called.

Plane geometry is given for one year in all the schools, for a year and a half in 9 per cent of them, and one school reports plane geometry for two years. Solid geometry is given for half a year at least in 75 per cent of the schools, and for an additional half year in 6 per cent. Plane trigonometry is taught in 58 per cent for half a year; one school reports surveying, three report spherical trigonometry, one reports analytical geometry.

In the reports handed in, physics is quite frequently listed as a mathematical subject.

EXAMINATIONS.

Examinations are set for admission to 69 per cent, for graduation in 86 per cent, for admission to higher institutions in 20 per cent. The greater part of the schools are accredited to certain universities after inspection by a State or university inspector, and have their graduates examined only for admission to distant institutions which do not accept high-school certificates. The custom is growing of accrediting elementary schools so that their graduates are admitted without examination to the high schools in their region. Examinations for promotion or graduation have quite generally been waived for pupils whose marks reach 90 per cent in their class work.

More than 80 per cent of the schools reporting one or more of these examinations as in use consider their effect on both teachers and pupils as beneficial. The 90 per cent exemption is enthusiastically commended and also unsparingly condemned.

METHODS OF TEACHING.

In the replies to the question whether the methods of teaching named in the following lists were in actual use or were educationally desirable, the first column gives the order of frequency, the second the order of preference:

- | | |
|--|--|
| 1. Measurement and computation. | 1. "Laboratory" method. |
| 2. Use of models. | 2. Measurement and computation. |
| 3. "Laboratory" method. | 3. Individual method. |
| 4. Individual method. | 4. Use of models. |
| 5. Use of cross-section paper. | 5. Use of cross-section paper. |
| 6. Combination of algebra and geometry. | 6. Outdoor work. |
| 7. Paper folding. | 7. Observational geometry to precede deductive geometry. |
| 8. Outdoor work. | 8. Combination of algebra and geometry. |
| 9. Observational geometry to precede deductive geometry. | 9. Heuristic method. |
| 10. Heuristic method. | 10. Paper folding. |
| 11. Combination of solid and plane geometry. | 11. Combination of solid and plane geometry. |
| 12. Combination of geometry and trigonometry. | 12. Combination of geometry and trigonometry. |

There is a suspicion that the word "heuristic" was unfortunately chosen, and that the word "combination" would have been with advantage replaced by "interweaving" or "blending." On this account the relative numerical standing of these replies is open to question.

In spite of the fact that fewer replies were made to the question of desirability than to the question of use, the desirability seems to have been considered with care, and the replies to be independently significant.

There are occasional reports of details of method, such as that geometry is taught "with applications to algebra," that the work is made "as practical as the textbooks will permit," that the pupils make their own models with string and cardboard. Where the number of originals given in geometry is stated, it ranges from 100 to 500; and one teacher states that 70 to 90 per cent of the time in algebra is devoted to problems.

A school superintendent writes that he has long suspected that "much of the algebra game is not worth the candle."

As to the question at what stage in the pupil's progress in mathematics emphasis should be placed upon his grasp of logical relations rather than upon manipulative skill, the replies range from the sixth grade of the elementary school (11 to 12 years of age), where arithmetic is the only mathematics in sight, to the last year in the high school, with perhaps a slight preponderance on the second year in the high school, where plane geometry is begun. On the whole this question does not seem to have been carefully considered by our correspondents.

The pupils are graded on the following grounds, arranged in the order of frequency:

Oral recitations.

Written class work.

Written periodical tests or term examinations.

The teacher's general estimate of power and achievement.

Voluntary original work.

Written home work.

The question whether methods of marking were such that the teacher could infer from the pupil's marks on record whether he was proficient in the several qualities listed below was answered by 45 teachers, of whom 60 per cent said that such inference was not possible; the question whether it was desirable was answered by 61 teachers, of whom 60 per cent gave a decided affirmative. The qualities referred to were:

I. Numerical accuracy.

II. Algebraic manipulation.

III. Knowledge of geometrical facts.

IV. Comprehension of successive logical dependence.

V. Mathematical invention and ingenuity.

Devices suggested for such a method of marking were specially ruled marking sheets or class record books. The comment was usually made that such a method of marking would be too cumbrous.

Only 2 per cent of the reply sheets received reported that there were mathematical clubs to which the pupils were admitted; only 11 per cent that there were collections of mathematical instruments, models, curiosities, or devices for instruction, accessible to teachers or pupils; and these collections were obviously in most cases only the modest outfit of apparatus for instruction.

AIMS.

The aim of the mathematical course in practically all of these schools, as indicated by the content of the studies, is college preparation, although 15 per cent of the replies do not acknowledge that aim. The purpose universally acknowledged is "general culture." Half of the schools reply to the question whether preparation for technical schools is a purpose of their mathematical study, and of these 75 per cent answer affirmatively.

As to the question for what particular occupations the mathematical work of the schools may be considered preparatory, the following is the order of frequency:

Accountant or merchant.

Civil engineer.

Mechanical engineer.

Surveyor.

Draftsman.

Computer.

Farmer.

Teacher.

Other replies were "practical work," trades, "practical finishing school." Many of the schools furnish from their graduates teachers for the elementary schools of the same region.

SUBCOMMITTEE 6. COEDUCATIONAL HIGH SCHOOLS ON THE PACIFIC COAST.

This report is the outcome of an investigation carried on by the subcommittee, through a questionnaire sent out from the Bureau of Education at Washington, D. C., and a somewhat more personal appeal sent out by the subcommittee to the public secondary schools of California, Oregon, Washington, Idaho, Montana, Utah, Colorado, Arizona, and New Mexico.

The subcommittee feels that, although about 200 replies were received, much of the information obtained is not particularly reliable,

because of the evident carelessness with which many of the answers were made. This very fact, however, leads the committee to draw certain conclusions about the prevailing type of mathematical instruction in the secondary schools. Although many of these conclusions are not particularly flattering to the teaching profession, we trust that they may lead some to a better appreciation of the present conditions and spur them to more systematic work. This report will follow the general topics as set forth in the questionnaire.

ORGANIZATION.

The larger schools naturally have a much more complete organization than the smaller ones, which fact leads us to classify the schools into two groups—those with 150 or more pupils and those with less than 150. This classification will in general mean city schools and country schools respectively, although, in the case of some of the union schools, we may find some of the first class in country towns.

The larger schools have a mathematics department, usually with a department head who is appointed by the school board or superintendent at the recommendation of the principal. In no case is the organization very formal, although in the best schools frequent informal and regular formal meetings of the mathematical teachers are held.

In the vicinity of the large cities, notably San Francisco, Los Angeles, Denver, Portland, and Seattle, the associations of mathematical teachers have a considerable influence on the methods of teaching. This is not so much the direct influence of papers read at the meetings of these associations as the influence which the writing of such papers has on the writer to bring the problem of teaching before him in a clear-cut form. In the best schools the majority of the teachers feel this influence, either directly, or indirectly through listening to the papers. The associations have a beneficial influence also in bringing about a uniform interpretation of the State university requirements. These requirements are the strongest influence upon the content and order of the mathematical instruction, and frequently papers upon new "requirements" bring out discussion which leads to a better understanding of the aim of such changes. Indeed, the universities welcome such suggestions as the associations are willing to offer, and thus these discussions may lead to a better adjustment of the "requirements" to existing conditions.

There are many schools which disclaim any influence from the State university. Nevertheless nearly every school desires to be accredited at the university; and even if this is not accomplished, the entrance requirements practically control the content of the courses offered. In fact, a California State law requires the high schools to offer a course preparatory to the State university.

The influence of the secondary-school instruction upon grammar-school work is not very perceptible, although in some cities where the principal of the high school is also superintendent of schools he has an influence over the curriculum of both schools, which naturally tends toward unifying the aims of instruction. This influence is felt perhaps more through the selection of textbooks than in any other way. Since the textbooks, once selected, must remain for four years in California, and six years in Oregon, a great degree of care is taken in the selection. The influence of the principals in such selections is rather strong, because teachers are often changed during the period of use of a book, making it impracticable to rely on their recommendations.

It may be said that in practically all cases the high school principal exerts the strongest influence in the selection of books, although his selection is subject to the approval of the board. In Oregon, however, an "unbiased commission of marked ability" selects uniform books for the grammar and high schools, thus taking the whole matter out of the hands of those directly concerned with their use.

Most of the teachers, especially in the small schools where more than one teacher is required for mathematics, spend a part of their time teaching other branches, notably science. In fact the student at the university who looks forward to high-school teaching fits himself to handle some second subject. In a majority of schools, however, the teacher of mathematics is not required to participate in other school activities, but it may be said that many do take advantage of the opportunity to become supervisors of student athletics.

From the standpoint of the teacher, then, the organization of mathematical teaching in the secondary schools may be characterized as very indefinite. Although State laws and university requirements tend to bring before the instructors definite topics for discussion and thought, the reaction on the part of the great majority of the teachers is very meager. Even where mathematical associations make a few of their members enthusiastic, the rank and file of the teachers do not concern themselves seriously with real problems of teaching.

The very fact that there were few replies from the large number of questionnaires sent out makes it plain to us that many of the teachers do not concern themselves vitally with the advancement of their profession. It is, however, undoubtedly true that the details of the work required of the teacher are so near to the limit of endurance that little time or energy is left for serious thought about methods or aims.

The formal organization of departments and active interest on the part of mathematical teachers are necessarily greatly hampered by these conditions. The interest being also somewhat divided between mathematics and other subjects, and the responsibility of selecting

books being partially shifted to others, produce a passivity on the part of the great majority which does not argue well for rapid future progress in mathematical teaching.

Conditions could be improved by a decrease in the amount of routine work, such as correcting papers, and a decrease in the size of classes. An increase in salaries would also, probably, attract more active and efficient men to the profession and thus bring about a better spirit among the workers. Such changes can not, however, be expected immediately, and in the meanwhile the mathematical teachers' associations and State inspection of the schools for the purpose of accrediting at the State university are the remedial agencies to which we must look for the advancement of the profession.

Most of the schools on the Pacific coast are so organized that students enter the high school after eight years of elementary training at ages ranging from 13 to 15, with an average of about 14.5. The course is uniformly four years, with four full years of mathematics offered in most cases. Commercial arithmetic is offered in some schools but is usually taken only by pupils who have a business career in view. In most of the schools only two years of mathematics are required, i. e., elementary algebra and plane geometry. Those students, however, who are preparing for the engineering colleges are required to take four years.

Promotion in some of the larger schools is semiannual, but in the smaller ones it is annual. This promotion is uniformly by subject and not by class, a student being catalogued in that class with which he is taking the majority of his work. The number of pupils who graduate from the older schools is about 10 or 12 per cent of the membership of the entire school each year, though in some cases the percentage is as high as 15.

From the standpoint of the pupils the organization of the schools is decidedly uniform throughout the Pacific coast States. A four-year course, with mathematics available each year, follows eight years of elementary school work; and promotions are annual and by subject. This uniformity makes changes from one school to another an easy matter for the pupil, and barring the difference in quality of instruction a student need not trouble himself to go to the larger cities in order to be prepared for any kind of further study.

This uniformity of organization, although it is due largely to the definite requirements of the State university, is also the result of public appreciation of mathematical training as an effective means of preparation for life. It is, of course, true that the State laws, which require the State universities to admit without examinations such students as come from accredited high schools, are largely responsible for the effort on the part of each school to maintain the required standard. A significant fact, however, is that were this law a serious

detriment to many young people, the public has the power to bring about the desired change of policy, not only as a State, but as individual towns, the school committees in which regulate the policy of their high school.

We may conclude then that, although the universities seem to control the organization of the high schools, yet this control does not in reality lie with even the State universities, for both public sentiment and the existing demands of high-school pupils really dictate the terms which the universities shall offer.

THE CURRICULUM.

The mathematical curriculum is usually determined entirely by the State university requirements, although the school board officially determines the question for any given school, and of course has the authority to offer courses with no mathematics, provided it offers one course preparatory for the State university. Consultation with the superintendent and principal is the formal method of this determination, but it is the prevalent custom to accept the subjects as laid out by the State university. The order and method of teaching is, however, more within the control of the mathematics teachers, and can be changed usually by conference with the principal. The State universities do not presume to dictate the order of topics or even of subjects. It is, nevertheless, true that many teachers and principals are greatly influenced by the preference which the State university professors may have for certain texts. Thus, if it is known that the State university staff has used or recommended a text which presents the subject in a certain order, either that text or another with a similar order of topics is liable to be selected by many schools. Indeed the publishers use the approval of certain texts by the professors as a strong argument for their adoption in the high schools.

Some attempt is made in the larger schools to correlate the algebra and geometry by teaching both as a continuation of arithmetic, and making them come under one general topic, mathematics. Separate texts are, however, used, and it remains largely with the individual teachers to bring about any really vital correlation. Correlation with physics, chemistry, and mechanical drawing seems to be somewhat widespread, but the correlation seems to mean chiefly that algebra and plane geometry are required as preparation for these subjects, or that some problems from these branches are introduced into the algebra and geometry courses. Original exercises are strongly emphasized, in some cases as many as 500 being worked in the year. Some attempt is made to obtain problems from "out of doors," but it can hardly be said that there are many practical problems used.

We find then, that the mathematical curriculum is determined by State authority of some kind, and is usually only slightly controlled by individual schools. The interrelation of mathematical subjects is not generally brought out, although a few of the most progressive teachers are trying to vitalize the work by breaking down the barriers surrounding each chapter of the text, and allowing the class to move about in a more unrestricted field, which gives them some concept of the real uses and significance of mathematics. For the most part, correlation either among mathematical subjects or between them and other subjects, seems to have no very definite meaning to the majority of teachers. Two causes may be cited as responsible for this. First, the average teacher has not the broad knowledge of mathematics beyond his subject which would enable him to appreciate the real significance of the various topics as they arise. He is not, however, wholly to blame for this, because the present conditions in secondary education do not give him time or money with which to put himself in touch with this broader knowledge. Nor does the remuneration offered in most schools seem attractive to those who have spent their time and money in thoroughly preparing themselves by the more comprehensive study of the subject. Having therefore no clear-cut understanding of how the subjects might be correlated, they are at a loss to know exactly what is meant by their correlation. Another cause is that the textbook publishers and writers, recognizing the desire on the part of the rank and file to have a text which can be accurately followed page by page, have given us books in which each chapter opens and closes a topic with as little reference as possible to other topics. Such texts run themselves, when once set in motion, and call for little teaching on the part of the instructor.

Under these conditions we can hardly look for much correlation or for much deviation from the presented order of topics, except in the case of a few of the best schools where an exceptional teacher has become aware of the possibilities of the subject.

EXAMINATIONS.

The general tendency seems to be toward fewer examinations and toward more than one recitation period for each examination. In most of the schools, pupils are admitted from accredited grammar schools without examinations, and are graduated from the high school on the basis of monthly or bimonthly tests, rather than on a final examination covering the whole course in mathematics, or even a whole subject. The State universities and many other higher institutions accept these graduates from accredited high schools, and thus the whole system tends to minimize the importance of examinations. There is considerable difference of opinion on the part of the teachers in regard to the desirability of formal examina-

tions. Some believe that they tend to produce superficial work on the part of both teacher and pupil, because the real aim of mathematical teaching is obscured by the desire to pass the examination. On the other hand, a large number express themselves as in favor of examinations as a means of producing thoroughness, as well as a means of emphasizing the aim of teaching, and of calling to the attention of the teachers the defects in their methods. They also claim for the pupils a larger interest and greater respect for the subject when examinations are prominent.

The elimination of final examinations, and even monthly tests, by means of high standing in daily work, seems to be a universal recommendation with those who advocate the examination as an incentive to good work. This would indicate that they consider the examination not so much a good thing in itself, as a spur to good daily work. If the pupil could be induced to prepare himself thoroughly for the examination, and then be excused each time from taking it, the examination would have served its purpose for all. Since, however, this is impossible, from the nature of the case, there seems to be little doubt that some sort of examination is necessary, though it be an evil.

METHODS OF TEACHING.

The specific methods of teaching mathematics classified as laboratory, heuristic, paper folding, etc., seem to have rather vague definitions in the minds of most of the mathematical teachers. The answers indicated a general use of "individual method," "measurement and computation," and "cross-section paper." A majority reported "models" and "outdoor work," and Colorado reports the use of "charts" in the review of geometry.

There is a decided disapproval of the "laboratory method" of teaching geometry. Practically none of the schools on the Pacific coast use it, and many express the opinion that it leads to looseness on the part of both pupil and teacher. Observational geometry is also opposed upon the same ground. If the "laboratory method" and "observational geometry" were used as an introduction to the formal demonstrative geometry, and the mere observation of facts by the class were only a means of bringing more clearly before the pupils what the real conditions are, the method might serve a very valuable end. The prevailing opinion seems to be, however, that the work tends to degenerate into substituting the evidence obtained from the observation of concrete objects for the logical proof which should follow such an observation. In the hands of some instructors the habit of careful and accurate reasoning may not suffer, but may rather be benefited from this kind of work. To the majority, however, it is a strong temptation to laxness.

Concerning the time for emphasis on logical reasoning, opinion is somewhat divided between the second year and the first half of the

third. The middle of the second year seems to be the most generally accepted time. The fact that the second year is the time when geometry is begun in most of the schools leads us to question whether the opinions expressed mean that the second year is really the time or that, because geometry is taken at this point, it is therefore the best time to begin logical reasoning. The fact that logical reasoning upon algebraic theorems is somewhat more difficult than that on geometrical theorems makes it true that very little attempt is made to force logical reasoning into the first year of mathematics.

It may, however, be true that if high-school mathematics could be begun with some simple forms of geometrical reasoning we should get better results in all of the mathematical work. This process might eliminate from the pupil's mind the idea that all mathematical generalizations can be learned by heart, and thus avoid some of the bad failures in geometry. If we could start the pupil with the idea that he can and must reason out the steps in a great deal of his mathematical work, should we not have a better attitude toward those parts of the work in which reasoning is the only possible method? First impressions are so lasting that it seems desirable that those first impressions should be more in accord with the real spirit of mathematics than to have them so nearly in line with the pure memory processes of the grammar-school work. Memorizing rules for each section of algebra is certainly not conducive to conceiving of algebra as a generalization of arithmetic. Some topics now given in algebra would probably be crowded out by this process, which must of course be somewhat slower, but in the end the increased power to think might well compensate for such topics as algebraic cube root and the division of long polynomials. The demand by the colleges for the "notion of functionality"¹ in algebra is along this line of making algebra a more logical subject.

All classes of work—oral, written home work, written class work, original work, and the teacher's general estimate of the pupil's ability—come in for about two-thirds of the final mark, while the formal examination gets credit for about one-third.

The tendency toward fewer examinations signifies a decreasing confidence in the examination as a test of ability. This lack of confidence, of course, makes the teacher count the examinations as a smaller and smaller fraction of the total mark and advocate the high standard of daily work as a sufficient test for the final grade.

In regard to disintegrating the marks into numerical accuracy, knowledge of facts, mathematical invention and ingenuity, it may be said that there is no systematic attempt to make such a separation. It is true, however, that many teachers unconsciously have a more or less defined method of marking work on this basis. When

¹ See requirements of University of California.

brought squarely before us, the details of such disintegrated marking impress most of us as too complicated for the rapid work which we have to do, but with a special class record book and smaller classes such a system might give us better information than we now get about a pupil's ability. It seems probable, however, that, if we could have the small classes, the intimate acquaintance which we should then have with the pupils would be a much better basis for marking than the details of such a system.

There seems to be a somewhat general feeling that the best teachers adopt no particular method of teaching, but try to acquaint themselves with the underlying principles of the subject and with the general nature of the pupils before them, and then adopt that method which will accomplish the purpose of the moment with a reasonable degree of success. Although the answers seem to indicate vagueness, on the part of the teachers, in regard to exactly what method has been adopted, this is perhaps due to the fact that those teachers who have considered the question of method do not consider themselves bound to any specific one. This is probably as true of marking as of methods of presentation.

AIMS OF MATHEMATICS TEACHING.

General culture and preparation for technical schools and colleges are both acknowledged by most of the high schools as the aims of their teaching. There is a decided denial of vocational aims, such as civil engineering, surveying, accounting, etc., although some schools record all these as secondary aims. It is probably true that the teachers and principals feel rather strongly on this point on account of the continual demand by pupil and parent for studies which will lead directly to some vocation. The attitude of the teacher has become, rather naturally, that of restraint for those pupils who wish to take only such subjects, and even only such topics as will furnish knowledge in the direct line of a given vocation. The teachers realize, as perhaps parents and children never do, that a groundwork of fundamental principles and processes must be laid before any success can be attained in the chosen vocation, be it engineering or accounting. If we should ask the pupils why they study their mathematics, and could get a reply for which they had not been coached, we should probably find more emphasis placed upon the vocational than the cultural aim.

Although the aim does not always keep itself prominently before most of us during the details of everyday work, we are evidently more or less conscious of very definite aims in our teaching of mathematics. Were this not true, the attempts to cover certain topics within certain stated periods, and the change of texts for the purpose of a better presentation of what we think is desirable, would not concern us very deeply. These aims may in many cases be only

preparation for some college or technical school, but general culture has a prominent place in the minds of most of the thinking teachers.

On the whole the results of this investigation have given us an insight into the conditions of the Pacific coast schools which, although very disappointing in many respects, is sufficiently general to be of value in feeling the pulse of the whole country. Any opinion in regard to the best remedy for the present conditions is hazardous, but the committee feels justified in calling attention to the fact that the most serious obstacle to the improvement of these conditions seems to be lack of professional attitude on the part of the teachers. Lacking this, there is little to build upon, either in improving methods or changing aims. This professional attitude may be said to consist of two essential features: First, a broad and thorough knowledge of the subject beyond the borders of the immediate topic in hand; second, and fully as important, a systematic and intimate knowledge of the fundamental principles of modern mathematical pedagogy. Regardless of the reasons why the rank and file of the teachers of mathematics do not possess this equipment, the desire for improvement which would come from such a professional training must be instilled in the teachers before we can expect to find much progress toward better conditions. It is, of course, true that a teacher should be first a man or woman possessed of the highest type of moral character, but if that be the whole equipment, he is not yet a teacher, any more than he is a physician or a lawyer or a preacher. The essential training which will make him work for the improvement of the profession, even when it is hard work, must have as a background that love of his subject and of his calling which can come only through a deep appreciation of what really constitute that subject and that calling. It would seem that a desirable minimum of preparation for a secondary school mathematics teacher should be so much of the subject, at least, as is involved in a first course in the calculus, and so much of pedagogical training as is involved in one year of the history and one year of the principles of education.

With such a groundwork of training for the majority instead of for the very small minority, we should be justified in expecting a professional spirit which would lead to wise and permanent changes tending toward better methods, better aims, and better content in the mathematical curriculum.

In compiling this report, we have supplemented the information furnished by the questionnaires with the best judgment we could obtain from those who have been in close touch with the school systems of the Pacific coast. The present tendencies are not sharply defined, but we are justified in concluding that there is on the part of many teachers a readiness to respond to any sane and thoroughly organized plan for improvement.

SUBCOMMITTEE 7. THE PREPARATION OF TEACHERS OF MATHEMATICS FOR THE PUBLIC HIGH SCHOOLS.

METHOD OF THE INVESTIGATION.

A questionnaire was sent to several hundred city superintendents, high-school principals, and teachers of mathematics. One hundred and sixty-five answers were received, representing 153 cities. Of these, 4 have over five hundred thousand population each, 20 have between one and five hundred thousand, 20 have between fifty and a hundred thousand, 50 have between twenty-five and fifty thousand, 22 have between ten and twenty-five thousand, and 37 have less than ten thousand. These reports represent some 900 teachers of mathematics in all parts of the United States, and are probably typical of conditions in cities whose aggregate population is between fifteen and twenty-five millions. It may be assumed that the large cities have on the whole better educational facilities than the smaller towns. The small towns could not easily be reached.

Letters were also sent to all State superintendents and to many high-school inspectors. Forty-seven replies were received. The character of the information received from them varied so greatly that it did not seem feasible to tabulate it, but it was carefully taken into consideration in making general statements.

The information concerning the facilities offered by our universities and colleges for the training of teachers was obtained by the examination of catalogues for 1909-10.

PRESENT STANDARD PREPARATION OF TEACHERS IN SERVICE.

The amount and quality of school training which high-school teachers in the United States have had varies so greatly with the section of the country and with the size of the school that it is impossible to make any single statement which is strictly true for all. However, there is a very widely prevalent standard which we may take as a point of departure.

It may be said in very general terms that the present standard high-school teacher is a graduate of an unspecialized course in college or university, without pedagogical training or special training in mathematics beyond the ordinary college course. This normally means that the teacher has had eight years in the elementary school, beginning at about 6 years of age, four years in the high school, and four years in the college. In the college the study of mathematics generally stops with a first course in calculus, and often with much less. There are wide variations above and below this standard.

There are six or seven thousand small schools scattered over all parts of the country which employ from one to three teachers, which support a course of from one to three years and which are generally

not on the lists of approved schools issued by the State departments of education or by universities. There are a number of States throughout which the educational standards are relatively low. From these States and from the small schools statistics are not easily obtained. Roughly speaking, they contain about 40 per cent of the high-school students in the United States. It appears that the teachers of mathematics are largely high-school graduates, most of whom have done some work in higher institutions, often normal-school graduates, with a small percentage of college graduates. In a few States the smaller schools generally employ college graduates, but these States are exceptional.

In the remaining schools of the country, containing, roughly, 60 per cent of the total high-school students, the majority of teachers are college graduates, and of those who are not, mostly the older generation, practically all have attended schools above high-school grade for from one to three years. In most parts of the country, even where standards are high, there is a small percentage of teachers of long experience who entered the work before present standards were adopted and who are not college graduates. Reports were received from 152 large schools or city systems, having in all some 900 teachers of mathematics. In these schools, as shown by the reports, 86.5 per cent have the A. B., or equivalent degree. These percentages for the different sections of the country and the number of schools reporting are as follows: New England, 27 reports, 94.5 per cent; Middle Atlantic States, 39 reports, 85 per cent; Central States, 56 reports, 83.5 per cent; Southern States, 12 reports, 79.5 per cent; Western States, 18 reports, 90.5 per cent. In basing conclusions on these figures, it should be noted that in some sections these schools are exceptional, while in others they are fairly typical.

Through the greater part of the United States, systems of high-school inspection and approval are in operation or are being established, either by State departments of education or by universities. The thoroughness of this inspection varies greatly in different States. In approved schools the percentage of college graduates, calculated for whole States, runs from 75 to nearly 100, varying with the section of the country.

TENDENCIES TOWARD HIGHER STANDARDS FOR TEACHERS.

That standards are being rapidly advanced is indicated by the fact that in by far the larger portion of the country in schools employing four or more teachers and preparing students for the universities new teachers are now quite generally graduates of universities or colleges of good standing, even though many of their older teachers are not. While large numbers of our high-school teachers are graduates of normal schools, that training is no longer regarded as ade-

quate in any large percentage of high schools. The percentage that have taken normal-school courses and have then gone on through their college course is probably quite large.

The fight for the recognition of the principle that high-school teachers should have the training represented by the bachelor's degree is practically won. There is but a small portion of the country where this is not at least a clearly recognized ideal, however remote from realization in practice. It is at this point that the real questions arise which concern the future. What does the college education which they receive mean to the prospective teacher as such? How can its value to him be made greater? What is the next step?

In this connection it is important to know what has thus far been done in the training of high-school teachers of mathematics beyond the unspecialized college course. Of the 900 teachers in large high schools above mentioned the reports indicate that less than 40 per cent have specialized in mathematics in their undergraduate course or have taken a master's degree. The number who have done work in mathematics equivalent to that required for a master's degree by our best universities is small, probably less than 10 per cent even in our best schools, and there are practically none in the medium-sized schools. Those who have the degree Ph. D. or who are doing serious research work in higher mathematics are rarely found teaching in high schools, since there is very little effective demand from the high schools from men of this preparation.

A notable example of a State in which the minimum requirement for high-school teachers is unusually high is California. There the minimum requirement is essentially that the candidate must present evidence that in addition to eight years in high school and college he has done a half year of graduate study in a university belonging to the Association of American Universities and a half year of practice teaching in a high school conducted for this purpose by such a university. These requirements are subject to certain modifications concerning practice teaching which do not materially alter the standard. So far as the committee has learned this is the highest minimum requirement in force throughout any entire State. In several cities minimum requirements practically equivalent to this are in force.

Two special influences have tended to retard the naturally growing demand for higher training, (1) a feeling that the specialist in mathematics does not easily adapt himself to the needs of the high school; (2) a distrust of the pedagogical training of the past. In a word, the separation of specialized scholarship from practical training in the art of teaching has tended to bring discredit on both. This is especially noticeable in the frequent intense and even unreasonable opposition to pedagogical training in the replies received. In this connection the fact should be noted that until very recently only a very few

institutions in this country offered practical training in the teaching of mathematics in connection with sound higher training in the subject matter.

Perhaps the most hopeful sign for the future is the recent establishment in many universities of teachers' colleges and schools of education where special attention is given to the training of teachers for secondary and higher schools in connection with the best opportunities for specialization in the subject matter and for broad general culture. From the high schools, underneath the current criticism of shallow pedagogy and narrow specialization, often expressed in violent opposition to one or the other, there comes an apparent strong desire for sounder scholarship and real efficiency in teaching. Many schools now require that all new teachers shall have had successful experience. As this requirement becomes more general the necessity for the practice school will become still more apparent. In this connection we give a brief statement of the present status of facilities for acquiring special pedagogical training in connection with advanced study of the subject matter.

FACILITIES OFFERED BY UNIVERSITIES FOR THE SPECIAL TRAINING OF TEACHERS OF MATHEMATICS.

On the pedagogical side there has been a remarkable advance in the facilities for the training of teachers of mathematics for high schools in the universities and colleges within the last three years. Three years ago (1907) but 10 out of 30 of our leading universities were offering courses in the teaching of mathematics. To-day 18 of that 30 are providing that instruction, while there are in all 38 universities and colleges giving special attention to such work.

Of these 38, but 11 require practical teaching.

The value of the history of mathematics is becoming recognized, but as yet only 29 colleges and universities are giving explicit courses in this subject. Of course more or less such instruction is given incidentally.

As to opportunities for training in the subject matter nothing need be said here. In all our better universities they are far beyond the present demands of our high schools. Prospective high-school teachers rarely fully avail themselves of the opportunities that are offered. Some universities, about eight in number, offer courses in the logical foundations of mathematics. That more do not offer such courses is probably due to the belief that an appreciation of the logic of mathematics is better obtained in courses in the regular subject matter than in a necessarily elementary course devoted explicitly to the logic of the subject rather than to any lack of appreciation of the importance of training in the logic of the subject. However, waiving this question as beyond our field, the question might well be raised whether prospective high-school teachers, whose training in the

subject matter is necessarily small, might not be benefited by a final course whose object should be to gather together their somewhat fragmentary knowledge into an organized whole, and perhaps to give them some idea of the meaning, purpose, and methods of the higher mathematics which they are not to study.

We restate a summary of catalogue data for 1909-10 by grouping universities into three classes. Column (1) gives the number of institutions that give courses in the teaching of secondary mathematics; column (2), practice teaching in mathematics; column (3), courses in the history of mathematics.

	(1)	(2)	(3)
Members Association of American Universities.....	13	10	7
Members Association of State Universities.....	19	14	10
Other colleges and universities.....	16	2	16
Totals (omitting duplicates).....	38	19	29

A very significant advance in this direction is the establishment of a degree with distinction for prospective teachers of mathematics, recently announced by Harvard University in the following terms:¹

The faculty of arts and sciences have established a degree with distinction in mathematics and education, intended to represent special preparation for the work of teaching mathematics in secondary schools. This degree is to be administered by a standing committee of three under the following rules:

In order to be recommended for this degree the student must have been known to the committee as a candidate during at least the last two years of his course, and he must have carried on his studies in his chosen field under the guidance of the committee.

The degree will be awarded on the basis of the following courses—

1. Mathematics and allied subjects.

- (a) A course in descriptive geometry or surveying.
- (b) Three and one-half courses in mathematics above the freshman courses.
The choice must include Mathematics 2.
- (c) Physics *C*, or its equivalent.
- (d) A course in astronomy.

The student is advised to take both descriptive geometry and surveying. In case he does so the requirement under (b) will be reduced to three courses in mathematics. He also advised to include the course in modern geometry (Mathematics 3) among his elective courses. He should in any case consult the chairman of the committee before finally making up his program.

2. Education.

- (a) A general introductory half-course (Education 2a) or a half-course in educational theory (Education 5a or 6a).
- (b) A course in the history of education (Education 1).
- (c) A course in secondary education, with practice teaching (Education 3b), or a course in elementary education, with practice teaching (Education 3c), or a course in school administration (Education 3a).

¹ The University Gazette (of Harvard University, Cambridge, Mass.), May 20, 1910.

The restriction expressed in the words “* * * above the freshman courses” excludes such topics as trigonometry and analytic geometry (introductory course) but admits a first course in the calculus (Mathematics 2) and the elements of mechanics.

Physics *C* is an experimental course in physics for students who have passed in physics for admission to college.

A course is the work implied in following a series of lectures occurring three times a week for about 35 weeks. Four courses, as a usual thing, constitute a year's work for a college student.

The committee reserves the power of exercising an independent judgment in each case; but it must always be satisfied that the program offered furnishes a sufficient basis for distinction, and that the quality of the student's work justifies his recommendation.

DESIRABLE STANDARDS IN TRAINING TEACHERS OF SECONDARY MATHEMATICS.

In this connection we must remember that the majority of those teaching mathematics in our high schools are prepared merely on the side of subject matter, while it is safe to say that in many of our smaller high schools algebra and geometry are taught by those who are not familiar with any mathematics beyond these same subjects.

Where the control of courses of study and the appointment of teachers are left with the local school boards, it is hard to adopt any set standards. By centralized control of secondary schools, it has been possible for Germany and France to maintain a high standard in selecting teachers for their institutions. We can not have national control of education; but by the work of our universities through the inspection of schools, and by State departments of education, much is now being done to elevate standards in the selection of teachers.

What then should we formulate as the proper university training for the prospective teacher of secondary mathematics in the United States? The present tendency gives us the key to an answer. The candidate for a certificate to teach mathematics in our secondary schools should be required to take (1) advanced courses in mathematics, to include at least a first course in calculus; (2) history of mathematics and its bearing on teaching; (3) courses in the general theory of education and in the teaching of secondary mathematics, the latter being given by one familiar with advanced mathematics, the history of mathematics, and the general field of education; (4) observation and practice teaching, in connection with this university training, under the supervision of a specialist in mathematical education. We may hope that candidates be not admitted as full secondary teachers until they have shown after a year's trial that they are specially fitted for the work. Beyond this it is highly desirable that they do some serious work in higher mathematics, including some course which will give them a broad and somewhat unified view of the field. The indications are that real advance in our standards for the higher education of our secondary teachers of mathematics will follow lines of compromise between the work of our best schools of education and the traditional highly specialized course leading to the degree of Ph. D. The pressing need of the hour is that our high schools insist upon, and our universities equip themselves for furnishing, the minimum preparation outlined above. Such a course will in

no wise interfere with the attainment of broad general culture and we believe will furnish the best preparation for the student who is ultimately to teach in the university.

OTHER FACTORS IN THE EFFICIENCY OF TEACHERS.

Summarizing reports from about 165 large high schools or city systems, the following facts are found: Forty-three and a half per cent of the teachers of mathematics are men. The lowest percentage of men teachers, 38 per cent, is found in New England. Two-thirds of these teachers teach only mathematics. In smaller schools not reporting, this proportion is no doubt very much less. Excluding four or five of the largest cities, where the percentage is considerably higher, it appears that about 80 per cent of the mathematics classes are taught by teachers whose chief interest is in mathematics. Teachers teach on an average 26 periods of from 40 to 45 minutes each, the number ranging from 20 periods of 40 minutes each to 40 periods of 45 minutes each. In New England the average is 23 periods. Eighty per cent of these schools teach trigonometry. No general tendency is discernible toward increasing or decreasing the amount of mathematics taught, individual tendencies about balancing.

The following questions were asked concerning salaries: What is the highest salary per year a mathematics teacher receives as such for full work? What is the lowest? What is the average? The following summary gives the number of cities or high schools which pay the salaries stated at the top of the column:

Number of cities or high schools paying certain salaries to teachers of mathematics.

	Over \$2,000.	\$1,501 to \$2,000.	\$1,001 to \$1,500.	\$751 to \$1,000.	\$500 to \$750.	Total number.
<i>Highest salaries.</i>						
New England.....	2	5	7	9	2	25
Middle Atlantic.....	4	12	15	6	2	39
Central.....	2	3	28	18	1	52
Southern.....	0	2	6	4	0	12
Western.....	0	8	9	1	0	18
United States.....	8	30	65	38	5	146
<i>Lowest salaries.</i>						
New England.....	0	0	0	8	16	24
Middle Atlantic.....	0	0	6	16	15	37
Central.....	0	0	4	31	14	49
Southern.....	0	0	0	6	5	11
Western.....	0	1	9	5	0	15
United States.....	0	1	19	66	50	136
<i>Average salaries.</i>						
New England.....	1	0	6	10	6	23
Middle Atlantic.....	0	5	11	10	2	28
Central.....	0	0	18	20	2	40
Southern.....	0	0	3	7	0	10
Western.....	0	2	10	2	0	14
United States.....	1	7	48	49	10	115

One hundred and thirty-five answers were received from superintendents and principals to the following questions:

In estimating the prospective value of a high-school teacher of mathematics, out of a hundred points, how many points would you give to each of the following?

- (1) Knowledge of the mathematics he is to teach.
- (2) Knowledge of mathematics of higher grade.
- (3) Ability in scientific research.
- (4) Pedagogical training.
- (5) General education and culture in other lines than mathematics.
- (6) Experience in teaching.

The following summary of answers received is self-explanatory:

Question.	Average of answers.	
(1).....	36.5.....	123 answers ranged from 20 to 50.
(2).....	11.1.....	123 answers ranged from 5 to 20.
(3).....	5.5.....	129 answers ranged from 0 to 10.
(4).....	11.7.....	115 answers ranged from 5 to 20.
(5).....	16.0.....	112 answers ranged from 5 to 25.
(6).....	19.2.....	110 answers ranged from 10 to 30.

The question as to whether any inferences of value can be drawn from these is left to the reader.

SUBCOMMITTEE 8. THE SIX-YEAR HIGH SCHOOL.

The traditional school organization of the country consists of an elementary, or grammar, school of eight grades—i. e., years—and a high school of four years. It has been proposed to shorten the grammar-school course to six years, and to incorporate the work of the last two grades, the seventh and eighth, with that of the high school, thus making the high-school course one of six years. The work of the subcommittee is an investigation of the curriculum in mathematics in such six-year high schools.

Excepting the Boston Latin schools, the movement for six-year high schools covers but a few years. The literature is chiefly of a general nature, dealing with the advantages to be gained from such schools, and containing next to nothing in the way of detail that would be of value in a report on the subject under investigation. A bibliography is appended to this report (see p. 94), but for the reason just given no especial pains have been taken to make it complete. The widespread interest taken in the movement is perhaps best indicated by the fact that the National Education Association (N. E. A.) has had a committee considering various aspects of the six-year high schools since 1906 (cf. bibliography, p. 94).

1. ADVANTAGES.

Among the advantages claimed for the six-year high school are:

(a) The use of departmental methods in what are now the last two years of the elementary school. Under the traditional system, pupils in the same grade are taught various subjects by but one teacher, while the six-year plan insures specialists for the teaching of each branch of study two years earlier than at present (but see sec. 2).

(b) The use of laboratories in which the study of elementary science might be begun two years earlier than at present.

(c) The possibility of beginning the study of modern languages earlier than at present.

(d) The transition from the elementary to the high school would be less abrupt than at present. This is insisted on very strongly by advocates of the new scheme.

(e) More pupils would continue their schooling beyond the eight years of the traditional elementary school.

(f) The easier use of manual-training shops and the introduction of industrial-training courses.

(g) In many localities the new plan would possess financial advantages; e. g., it would permit the full use of buildings already erected and relieve the pressure for more buildings for the elementary schools for some years to come.

For a fuller account of advantages claimed see the N. E. A. reports for 1907 and 1909 and the 1909 pamphlet of the New York City Club.

2. APPROXIMATIONS TO SIX-YEAR HIGH SCHOOLS.

(a) Several cities in the country have adopted departmental methods in the seventh and eighth grades, and some of these regard it as a definite step toward the six-year high school, while others think of it as merely a change in the methods of the elementary school. Even in the latter cities several of the advantages claimed for the six-year high school have been enjoyed.

(b) In some cities the high-school course has been lengthened to four and a half or five years.

(c) In some cities there are separate schools for a part of the pupils in the seventh and eighth grades. In these schools the work is correlated with that of the regular four-year high school more closely than in the regular grammar school. Especially bright pupils from these schools may, in some cities, complete the high-school course in three years.

The subcommittee realized at the beginning of the investigation that these various approximations should be included in its study.

3. METHOD OF THE INVESTIGATION.

Following every clue received by correspondence or in the literature resulted in the compilation of a list of 29 cities reported to have a fair approximation to the six-year high school and of 27 cities in whose schools departmental methods are said to be employed in the seventh and eighth grades. While the latter list contains all cities of the sort indicated which came to the attention of the subcommittee, no especial effort was made to compile a complete list. This was due to the fact that three important cities reported by the Bureau of Education at Washington to contain schools belonging to the second class were investigated personally by different members of the subcommittee during the last summer (1909) and found to offer nothing of value for this report.

The subcommittee is indebted to the courtesy of Mr. Charles S. Hartwell, 234 Willoughby Avenue, Brooklyn, N. Y., secretary of a joint committee of the teachers' associations of New York City and Brooklyn conducting an extensive investigation of school organization, for nearly all the cities on both lists, and for many helpful suggestions.

In advance of the information that the Bureau of Education had offered to circulate questionnaires, the subcommittee mailed a circular letter to the superintendent of schools in each of the cities on the two lists, with a request that an inclosed letter be handed to a teacher of mathematics. Later a copy of the second letter, somewhat modified, was mailed to the department of mathematics of the high school in each of the cities on the first list from which no reply had been received. The replies from the cities on the second list indicated that it was not worth while following up those not answering the first letter. Conditions in a few cities were investigated personally, and no letters were mailed to these cities.

4. ANALYSIS OF THE INFORMATION RECEIVED.

The number of schools investigated is so small, and their forms of organization and curricula so varied, that it is impracticable to tabulate the information received. Instead, the report can only present a summary of the situation in each school (sections 6-11), and a few general comparisons (section 13). The value of the latter must be estimated in the light of the fact that the number of schools is small and that the conditions in different parts of the country vary a great deal.

The subcommittee is able to report upon:

(a) Five schools organized on precisely the lines indicated in section 1. (Section 6.)

(b) Two schools approximating that organization very closely. (Section 7.)

(c) Two five-year high schools. (Section 7.)

(d) One four-and-a-half-year school. (Section 7.)

(e) Four cities having special schools preparatory to high school. (Section 8.)

(f) Six cities having departmental methods in the seventh and eighth grades (section 9), but not all of these regard this as an approximation to a six-year high school.

(g) Two have a different form of six-year high school. (Section 10.)

(h) One noteworthy private high school. (Section 11.)

Neglecting (f), (g), and (h) the subcommittee can report upon but 14 six-year public high schools or approximations thereto.

The cities on both lists not covered in the above classification were either not heard from at all or offered little of value to the subcommittee.

Cities employing departmental methods in the seventh and eighth grades have not, so far as information at hand shows, made much effort to mold the mathematics in these grades and in the high school into a homogeneous whole, and hence, contrary to hope, they furnish little of value to the subcommittee.

5. THE TRADITIONAL CURRICULUM.

For a proper appreciation of the following sections it should be understood that the traditional curriculum has been, roughly, arithmetic in the seventh and eighth grades of the elementary school, elementary algebra (i. e., algebra through quadratic equations, arithmetical and geometrical progressions, etc.), and plane geometry in the high school. Most high schools also offer solid (including spherical) geometry, advanced algebra (i. e., such topics as permutations, logarithms, theory and numerical solution of equations, etc.), and plane trigonometry.

Solid geometry, advanced algebra, and trigonometry are required for admission to technical schools but are usually taught in the first year of college work. Hence students preparing for college do not usually take these subjects in the high school. In the West, solid geometry is usually required for admission to college.

These subjects have usually been taught with very little attention to their interrelations, and many students take mathematics during but a portion of the four years in high school; e. g., a student may take elementary algebra the first year, plane geometry the second, no mathematics the third year, and a review of one or the other of these subjects in a portion of the fourth year.

Abbreviations used in sections 6-12:

Arith. for arithmetic.

Alg. for elementary algebra.

Geom. for plane geometry.

Trig. for plane trigonometry.

Adv. Alg. for advanced algebra.

Obs. Geom. for observational geometry.

The six years of the course are named uniformly in this report, but usage varies in different schools.

6. SIX-YEAR HIGH SCHOOLS.

Boys' Latin School and *Girls' Latin School*, constituting The Public Latin School in Boston, Mass., founded 1635. This has been a six-year school for a great many years, preparing students for college but not for technical schools.

First year: Arith. 3,¹ Obs. Geom. 2.

Second year: Arith. 3 ($\frac{1}{3}$ year), Alg. 3 ($\frac{2}{3}$ year), Obs. Geom. 1 (the entire year).

Third year: Alg. and Obs. Geom. (correlated) 4.

Fourth year: Alg. 3 ($\frac{1}{2}$ year), Geom. 3 ($\frac{1}{2}$ year).

Fifth year: Geom. 3 ($\frac{1}{3}$ year), Alg. 3 ($\frac{2}{3}$ year).

Sixth year: Plane and Solid Geom. 4.

Recent changes, as indicated by printed reports, are: The placing of algebra as early as the second year and of formal geometry as early as the fourth year; the teaching of some geometry in each year. But, essentially, this curriculum has been in operation for some years.

Roxbury Latin School, Roxbury (Boston), Mass., founded 1645.

First year: Arith. (a little Alg.) 3.

Second year: Arith. 2 ($\frac{1}{3}$ year), Obs. Geom. 2 ($\frac{2}{3}$ year).

Third year: Alg. 4.

Fourth year: Alg. 3 ($\frac{2}{3}$ year), Arith. 3 ($\frac{1}{3}$ year).

Fifth year: Alg. (a little Adv. Alg.) 3.

Sixth year: Geom. 5.

Adv. Alg., Solid Geom., Trig. (electives).

Lead, S. Dak.—The course in mathematics covers but five years. Exceptionally bright pupils may do all the work of the six-year course in five years. The six-year course has been in effect five years.

First or second year: Arith. 5.

Third year: Alg. 5.

Fourth year: Geom. 5.

Fifth year: Alg. 5 ($\frac{1}{2}$ year), Solid Geom. 5 ($\frac{1}{2}$ year).

Sixth year: Adv. Alg. 5 ($\frac{1}{2}$ year), Trig. 5 ($\frac{1}{2}$ year).

¹ The number is that of recitations per week, when it is known. The recitation period is usually 40 or 45 minutes.

Algebra was formerly taught in the second year, but has been put back into the third year.

Hope Street English and Classical High School, Providence, R. I.—The report of their curriculum is incomplete.

First year: Arith. (probably).

Second year: Alg. 3.

Last four years probably Alg., Geom., Solid Geom., Adv. Alg., and Trig.

Principal Charles E. Dennis, jr., writes:

“Correlation consists in not emphasizing the advanced portions of arithmetic, i. e., geometrical measurements, and omitting cube root entirely. These subjects are better taught in connection with algebra and geometry.”

Remarks.—Four of the five schools introduce some algebra in the first two years. In the fifth, algebra has recently been dropped from the second year.

The three Latin schools introduce some geometry in the first two years. They also provide for a continuous course of six years.

Two of the five schools do not offer trigonometry.

In at least four of these schools the traditional “tandem method” of arranging courses has been somewhat broken up. This breaking up is especially noteworthy in the Boston Latin schools.

7. CLOSE APPROXIMATIONS TO THE SIX-YEAR HIGH SCHOOL.

(*Five-year and four-and-a-half-year high schools.*)

Crawfordsville, Ind.—“The seventh and eighth grades and the high school occupy the same building in our city and all are organized on the departmental plan. There is a slight division between the eighth-year course and high school, but it is very slight. We consider the arrangement an approximation to a six-year high-school course.”

First year: Arith.

Second year: Arith. and Alg.

Last four years: Alg. ($1\frac{1}{2}$ years), Geom. (1 year), solid Geom. ($\frac{1}{2}$ year).

Richmond, Ind.—Information on Richmond is due to the kindness of Mr. Hartwell, who kindly sent the subcommittee a copy of a letter from the superintendent of schools.

For twelve years the seventh and eighth grades have been housed in a separate building in which departmental methods are used. The heads of the departments are the heads of departments in the high school.

“We are much pleased with this plan. We are hoping to be ‘brave’ enough to print our high-school course as including the six grades *in name* as well as *in fact*.”

First year: Arith.

Second year: Alg. ($\frac{1}{2}$ year).

Last four years: Probably Alg., Geom., Solid Geom., Adv. Alg., and Trig.

The Muskegon High and Hackley Manual Training School, Muskegon, Mich.—A five-year high school. "The seventh-grade work in our city schools is given in the ward schools in a departmental system. The eighth-grade work is given at the high school, making with the regular four years' work a course of five years."

First year (seventh grade, not in five-year course): Arith.

Second year: Arith. ($\frac{1}{2}$ year), Alg. ($\frac{1}{2}$ year).

Third year: Alg.

Fourth year: Geom.

Fifth year: Alg. ($\frac{1}{2}$ year), Geom. (Solid?) ($\frac{1}{2}$ year).

Sixth year: Trig. and Alg.

"In our first two years of algebra we cover about the same ground usually covered in $1\frac{1}{2}$ years in other high schools."

"We are contemplating extending the one-half year of arithmetic to a whole year in the eighth grade, perhaps retaining a little introductory work in algebra."

"Due to our extended work in manual training we require mathematics only through plane geometry for most students."

Woodward Avenue High School, Kalamazoo, Mich.—Approximately a five-year high school.

"Our seventh grade is not departmental. The eighth-grade program is arranged on the same plan as the high school: Pupils sit in a grade room where they keep their books and to which they go after each class. As the class bell calls, pupils go to their respective classes, or if they have no class, to the general study room for eighth grade and high school."

First year (seventh grade, not in five-year course): Arith.

Second year: Arith.

Third year: Alg., Arith. ($\frac{1}{2}$ year, elective).

Fourth year: Alg. ($\frac{1}{2}$ year), Geom. ($\frac{1}{2}$ year).

Fifth year: Geom. (probably plane and solid, elective).

Sixth year: Trig. ($\frac{1}{2}$ year), Alg. ($\frac{1}{2}$ year) (both elective).

Pittsburg, Kans.—A four-and-a-half-year high school, organized nine years ago.

First year (seventh grade, not in four-and-one-half-year course): Arith.

Second year (last half in four-and-one-half-year course): Arith.

Last four years: Probably Alg., Geom., Solid Geom., Adv. Alg., and Trig.

Remarks.—In three of these five schools algebra is introduced in the first two years and no geometry is given in these years in any of the five.

8. APPROXIMATION CONSISTING OF A PREPARATORY HIGH SCHOOL AND A REGULAR HIGH SCHOOL.

Worcester, Mass.—Special schools for a portion of the pupils in the seventh and eighth grades and a four-year high school.

First year (seventh grade): Arith.

Second year (eighth grade): Arith. ($\frac{1}{2}$ year), Alg. ($\frac{1}{2}$ year).

Third year: Alg.

Fourth year: Geom.

Fifth year: Adv. Alg. and Solid Geom.

Sixth year: Review of Alg. and Geom.

Superintendent of Schools H. P. Lewis writes: "I believe thoroughly in a six-year high-school course in which the curriculum would be different in many points from that of the last two years of the elementary course and the present four years of the high-school course."

Grand Rapids, Michigan.—Superintendent of Schools William A. Greeson writes: "In two buildings we have the departmental organization. * * * The curricula in these grades (the seventh and eighth) have not been closely correlated with those in the high school."

It is inferred from other portions of his letter that these buildings are used exclusively for the seventh and eighth grades.

"As soon as our two high-school buildings are completed and occupied by the high schools, we shall have two buildings * * * which can be used for the seventh, eighth, and ninth grades. It is our purpose then to organize these three grades upon a modified high-school plan."

First year: Arith.

Second year: Arith.

Third year: Alg.

Fourth year: Alg. ($\frac{1}{2}$ year).

Fifth year: Geom.

Sixth year: Solid Geom. ($\frac{1}{2}$ year), Adv. Alg. ($\frac{1}{2}$ year), Trig. ($\frac{1}{2}$ year).

Lincoln, Nebr.—There is a five-year course consisting of: First, a course of two years, known as preparatory to the high school, for especially bright pupils, which covers, with some omissions, the work of the seventh and eighth grades and that of the first year of the regular four-year high school. Second, the last three years of the high school.

First year: Arith. and Obs. Geom.

Second year: Arith.

Third year: Combined with first two.

Last three years: "A completely blended course of algebra and geometry."

There is no mathematics in the first year of the regular four-year course except in the commercial department. What is taught there is presumably arithmetic.

Baltimore, Md.—Children with a sufficiently good record in the sixth grade of the elementary school may attend any one of four schools doing work in the seventh and eighth grade preparatory to high school. A good student may complete these grades and the work of the regular four-year high school in five years. The curriculum is probably the traditional curriculum. (Section 5.)

Remarks.—One of these four schools introduces algebra in the first two years and but one introduces geometry.

9. APPROXIMATIONS CONSISTING MERELY OF DEPARTMENTAL METHODS IN THE SEVENTH AND EIGHTH GRADES.

Aurora, Ill.—Superintendent of Schools C. M. Bardwell writes:

Our seventh and eighth grades are distinct from the high school, as in case of most other systems. The accommodations necessitate this.

For a number of years we dropped the subject of arithmetic at the end of the sixth grade, and took for the next half year inductive, or constructive, geometry. We began algebra the second semester of the seventh grade and carried it through the eighth grade, with recitations five times a week. We have changed this, however, in the last year and have introduced arithmetic twice a week, carrying over the subjects that we had formerly had in the sixth grade, but omitting most of the technical applications of arithmetic.

The work which we give the children in mathematics in these grades (the seventh and eighth) is not so much with a view to fitting them to some special course in the high school, or a hasty completion of regular mathematical work, but rather because it seems to fit their needs from a standpoint of their intellectual growth. They seem to enjoy their work in algebra intensely, and act as though it were something that they really feel the need of and a desire for.

Saginaw, Mich.—This city is popularly reported as being a pioneer in the six-year movement.

First year: Arith. 4.

Second year: Arith. 4.

Third year: Alg. 5, Commercial Arith. 5, Industrial Arith. (in process of evolution).

Fourth year: Alg. 5 ($\frac{1}{2}$ year), Geom. 5 ($\frac{1}{2}$ year).

Fifth year: Geom. 2.

Sixth year: Alg. (some Adv. Alg.) 3 ($\frac{1}{2}$ year), Solid Geom. 3 ($\frac{1}{2}$ year), Trig. 3 ($\frac{2}{3}$ year), Surveying 3 ($\frac{1}{3}$ year).

In the fourth year, geometry is studied without a text.

Herkimer, N. Y., and Franklin, Ind.—These schools have the traditional curriculum (section 5) except that the latter has no trigonometry.

Iron Mountain, Mich.—“We formerly had departmental work in the seventh and eighth grades for eight or nine years, but have partly abandoned it and entirely so in mathematics.”

"A little algebra and geometry" is introduced in the eighth grade.

Algebra and geometry are "mixed" in the last two years.

Indianapolis, Ind.—Departmental methods are not regarded as an approximation to a six-year school. The city is mentioned chiefly on account of the fact that correlation has been highly developed in the high school and on account of the following excerpt from a letter from Mr. W. W. Hart, head of the department of mathematics, Shortridge High School:

"I might say that it is our intent to have very little algebra in the eighth grade in the future on the ground that such work does not seem to be of sufficient practical value to the boy and girl who does not go to the high school."

10. A SECOND FORM OF SIX-YEAR HIGH SCHOOL.

A movement has developed in the Middle West for the introduction of two years of graduate work in the high school, covering approximately the first two years of college work. In mathematics this necessitates the teaching of analytic geometry and differential and integral calculus in addition to all the courses of the traditional curriculum. (Section 5.)

Joliet, Ill., and *Goshen, Ind.*, have organized high schools on this basis. In the latter city the seventh and eighth grades are organized departmentally. Bright pupils may begin algebra in the eighth grade, but otherwise the curriculum does not differ from the traditional curriculum.

11. THE HORACE MANN SCHOOL.

This high school is connected with Teachers College, Columbia University, and is intended to be a model high school. It is not a public high school in the sense that there are no tuition charges. Some departments offer six-year courses as well as a four-year course. The department of mathematics offers, in addition to a four-year course, the following five-year course:

First year: (Not in the course.)

Second year: Alg.

Third year: Alg.

Fourth year: Geom.

Fifth year: Alg. ($\frac{1}{2}$ year), Solid Geom. ($\frac{1}{2}$ year).

Sixth year: Trig. 3 ($\frac{1}{2}$ year), Adv. Alg. (a little analytic Geom.) ($\frac{1}{2}$ year).

12. A PROPOSED CURRICULUM.

In a paper in the *Educational Review*, vol. 25 (1903), pages 455-63, Prof. Paul H. Hanus proposes a readjustment of the entire education system of the country. He proposes (p. 458) a six-year course for two high schools of three years each, as follows:

First year: Alg. 2, Obs. Geom. 2, Arith. 1.

Second year: Alg. 2, Obs. Geom. 2, Arith. 1.

Third year: Arith. 3, Obs. Geom. 2.

Fourth year: Alg. 2, Geom. 3.

Fifth year: Alg. 4, Mechanical Drawing 1.

Sixth year: Solid Geom. 5, Trig. 5.

13. GENERAL CONCLUSIONS.

In conclusion, the subcommittee can do little in the way of general remarks. Comparing the 14 schools considered in sections 6-8, the following variations from the traditional curriculum may be noted:

One school teaches algebra and three teach geometry in the first year.

Seven teach algebra and three teach geometry in the second year.

Four schools have correlated the arithmetic, algebra, and geometry sufficiently to break up effectively the "tandem method" of arranging courses. Information at hand is not sufficiently detailed to indicate how much correlation, if any, is attempted in many of the other schools, but the presumption is that there is but little.

Three of the six schools in section 9 present variations from the traditional curriculum in some of these ways.

It is thus seen that the tendencies to insert some algebra and geometry in the last two grades of the elementary school, and to weld arithmetic, algebra, and geometry into a unified course in mathematics, tendencies which have been much discussed in recent years, are being tried out more or less thoroughly in the schools whose organizations approximate the six-year high school. So few schools, however, replied with a description of their courses by topics, as requested by the subcommittee, that it would be useless to attempt to tabulate what little detailed information has been received. The Boston Latin School stands foremost in exemplifying both of these pronounced tendencies.

Further information on these tendencies in schools organized on traditional lines will doubtless be found in the reports of other committees and subcommittees engaged in this investigation.

There has also been much discussion in recent years concerning the introduction into the high school of essentially new matter, such as the elements of analytic geometry and the calculus, but none of the schools investigated have done this (except the two in section 10 which teach the first two years of collegiate work).

While one vigorous protest against the movement was received (Bloomfield, N. J.), the general tone of the letters received by the subcommittee indicates an enthusiastic belief in the six-year high school.

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SUBCOMMITTEE 9. FAILURES IN THE TECHNIQUE OF THE TEACHING OF SECONDARY MATHEMATICS: THEIR CAUSES AND REMEDIES.

INTRODUCTION.

In this commercial age, which makes efficiency the controlling factor in all walks of life, the teacher must not expect to escape a searching scrutiny of his results or criticism of his methods. The general public has at last begun to watch with interest, not entirely free from meddlesome curiosity, the work of its tax-supported schools. It is well that it should be so. For may not many of the educational crises of the past be traced to the aloofness of the average teacher from the active world? Separated from the noise and the merciless competition of real life, the school frequently fails to make those unavoidable readjustments which a business establishment effects almost automatically in its effort to remain "up to date."

Thus it happens that the educational process so often is "behind the times." With majestic inertia the school system glides on in its

accustomed and "approved" course, long after the familiar landmarks have disappeared and the compass needle points to strange and untried seas. Finally there are dangerous collisions and the passengers complain of the wearisome, aimless trip. Then the educational pilots are roused from their stupor and frantic efforts are made to ascertain the "new course." A "reform wave" is suddenly espied, and carried by this "new movement" the distressed craft tries to regain its bearings.

Another reason for this lack of adjustment lies in the difficulty of the educational process. A new machine is easily installed. A mechanical improvement can readily be tested. Not so the infinitely subtle machinery of the mind. A well-known psychologist frankly admitted that in regard to many aspects of the educational problem psychology is as silent as a sphinx. Scientific pedagogy is only in its infancy. It will be found that in most cases the successful teacher, cautioned of course by scientific study against obvious blunders, rises on the basis of sympathy and tact to the experimental acquisition of a satisfactory technique. But all experimenting takes time. Unless undertaken with the utmost care, it is almost sure to mean educational waste. To this should be added the fact that the average teacher holds office for a short period only and that many schools have practically new faculties every year. The new and inexperienced teacher either follows the rut left by his predecessors or indulges in experimentation of a more or less doubtful character. Only a small percentage of secondary teachers have specialized in their work sufficiently to become really creative.

Thus we have a constant oscillation from stagnation to frantic reform. And it is difficult to determine which is more amusing: The abyssal, cocksure self-complacency of the orthodox old-timer, or the innocent glee of the reformer who announces a new patent remedy for all educational ills. What we really need is a less jerky and erratic development, less dangerous stagnation and more genuine progress.

PURPOSE OF THIS REPORT.

The present inquiry was undertaken with a view to answering the following questions:

- (1) Are the results obtained in the teaching of secondary mathematics satisfactory?
- (2) If not, is mathematics taught more poorly than other high-school subjects?
- (3) In case it is taught as well, and yet the results are poor, what general or specific causes of failure can be pointed out?
- (4) What remedies can be suggested?

METHOD OF INVESTIGATION.

The subcommittee first sent out about 120 circular letters. These brought about 40 replies. Then a somewhat modified form of the first circular was sent out to a large number of high schools by the committee on public high schools, of which this subcommittee is a part. This second effort resulted in more than 80 additional replies, bringing the total up to about 125. A detailed summary of these answers will be found at the end of this report. Many important educational centers responded splendidly, especially New York and Philadelphia. It appears from these answers that the teachers of mathematics do not believe that their subject is taught more poorly than other secondary subjects.

A second source of information was furnished to the committee by the statistics of two examining bodies, the Regents of the State of New York and the College Entrance Examination Board. It may be argued with perfect candor, of course, that examinations are a very unreliable criterion of pedagogic conditions, and that examination results are often inversely proportional to good teaching. However, these results will furnish some comparative data of great value. Hence we feel justified in submitting the subsequent statistical tables.

In the third place, we must mention the many valuable contributions to a solution of our problem in the educational literature of the past 10 years, in the reports of associations of teachers, etc. So vast is this material that the committee assimilated only a small portion of it. Excellent reports and discussions may be found in recent volumes of *School Science and Mathematics*, the *School Review*, the *Mathematics Teacher*, etc. It can not be said that the comments found in these journals are altogether reassuring. There is constant complaint of educational waste and inefficiency.

STATISTICS OF FAILURES.

The records of the Regents' Examinations and those of the College Entrance Board (for statistics, see Appendix), seem indubitably to warrant the following conclusions:

(1) Mathematics is not taught more poorly than other secondary branches.

(2) The results are not satisfactory. The second conclusion would be even more obvious if the percentage of failures included the pupils who dropped out during their course, i. e., if it were based on the initial registration of the school. Evidently from 40 to 50 per cent of all students pursuing mathematical work in secondary schools do not complete their work satisfactorily, if examinations can be trusted to determine the pupil's mental equipment.

Views of individuals.—Having considered the objective verdict of statistical records, we turn now to the more or less subjective views of

individual teachers and schools. Dr. N. J. Lennes writes (*The Mathematics Teacher*, March, 1909):

One of the most obvious facts about mathematics in our secondary schools is a very general dissatisfaction which is expressed on all sides. There is an alarming number of failures, especially in the first year of the high school, which argues that the pupils do not find the subject suited to their tastes and capacities. Instructors in the colleges and universities rarely miss an opportunity for declaring that their students come poorly prepared. The programs of teachers' meetings and the tables of contents of pedagogical journals are teeming with titles which assume that something is wrong.

The college side of the question is discussed at some length in the *Cornell Register* (1909-10, p. 43). After stating that the preparatory work in mathematics should equip the student with (1) a "certain degree of mathematical maturity," (2) "an accurate and ready knowledge" of specific facts, it continues as follows:

On the other hand, most students who fail in their university mathematics fail because they are poorly equipped in the second requirement above mentioned. For example, they can not perform the ordinary operations of algebra either rapidly or accurately, they do not know the theory of quadratic equations, they are lost among trigonometric formulas, and they blunder when they use logarithms. Instead of spending their time and energy upon their new work, they must spend much of it in studying up those things with which they ought to be familiar, and thus handicapped they can not keep up the pace set by men who are properly prepared, and they can not do the work that must be done to fit them for the professional work that follows.

It is not sufficient that the student should once have known his preparatory mathematical subjects; he must know them at the time when he begins his work here. It seems absolutely essential, therefore, that these subjects be very carefully reviewed just prior to entrance.

The general dissatisfaction referred to above has induced some alarmists to put mathematics on the list of elective subjects. How characteristic a blunder! As if mathematics, the foundation par excellence of our scientific era, could by a mere stroke of the pen become an optional study, merely because many teachers do not know how to make it palatable, or because our ill-arranged curricula can not accomplish wonders, or because so many of our boys and girls have been allowed to follow the line of least resistance. For a discussion of this elective tendency we must refer to the Third Report of the Association of Mathematical Teachers in New England (Boston, 1906).

CAUSES OF FAILURE—PRELIMINARY ANALYSIS.

If we turn now to a consideration of the causes of failure, it becomes at once apparent that our problem is both general and specific. General, in that mathematics is not alone in its inferior results, a fact proved beyond dispute by statistics. Specific, in that we must determine the particular aspects which this general deficiency assumes in the mathematical classroom, as well as the particular remedies that mathematics may offer for overcoming the general weakness. The

individual teacher, when confronted by a large number of failures, rarely takes a sufficiently broad view of the situation. In some cases he frankly blames his own limited preparation, his prosaic and uninteresting methods, his lack of enthusiasm. Usually it is the pupils who are condemned in toto, or it is the school system or any number of other factors.

There is little doubt that nearly every high school subject is taught with clearer perception of its aim, methods, and content than a generation ago. It is even claimed by some that results are better than formerly. (Cf. Report on the Norwich tests, School Review, May, 1910.) If in spite of this improvement and this increased effort our expectations are so poorly realized, must we not first of all look for underlying causes and conditions beyond the control of the average teacher or even the average school?

It has been said over and over again that we are living in a transition period. Old standards are being replaced by uncertainty and scepticism. Education is powerfully affected by this general unrest. Hence, any consideration of the causes of failure would be incomplete and meaningless without a study—however brief and imperfect—of the influences that are transforming our educational system.

TRANSFORMING INFLUENCES IN EDUCATION.

For a brief summary of the present tendencies in education we may refer to a paper read by the chairman of this committee at the Cleveland meeting of the N. E. A. (published in *School Science and Mathematics*, November, 1908). The following quotations are taken from it:

1. In the first place, modern industrialism, with its demand for tangible success, has led to a great outcry for more practical school work. There is an increasing contempt of "mere theory." This feeling finds its expression in the establishment of trade and technical schools. Mathematics, as usually taught, furnishes a welcome target to the utilitarian educator. As a result there is a growing fear that we may drift too far from the ideal of liberal culture and that the direct bread-winning power of a subject may be made the sole criterion of its usefulness.

2. Our large cities, the natural centers of industry, are also becoming great centers of population. Naturally the struggle for existence is becoming keener. Many parents are now sending their children to the high school to fit them, in the briefest possible time, for a more comfortable life than they themselves enjoy. This has made the high school population more diversified than ever before, and the demands imposed upon the schools have become more numerous from year to year. *For the first time in history, secondary education is truly democratic.* But it can not be denied that the assimilation of so much raw material from homes giving no cultural impulses, and of so many students having no intention of entering higher institutions of learning, is one of the most serious problems of the high school.

3. More far-reaching than these changes of ideal and environment have been certain revolutions in school curricula and methods of instruction. The natural sciences have risen from comparative obscurity to great prominence. Their inductive method of investigation is considered by many as the great panacea for all our troubles. The

influence of the laboratory method is undeniable. It is reacting, for example, on the teaching of history and the languages. In so far as it insists on self-reliance and definiteness of results and is productive of greater interest, it is excellent. But it lengthens school hours, calls for costly equipment, and demands much outside work on the part of pupil and teacher.

4. It would be difficult, moreover, to overestimate the effect of the "new education." Its fundamental precept that all work must be arranged psychologically and adapted strictly to the child's power of comprehension is eminently sound. But it has also given us the enriched curriculum, and the doctrine of interest which replaces all objective standards by the subjective attitude of the child. Unquestionably this means at once a distinct advance and a very real source of danger. The complaint is not infrequent that in many cases the young are learning to depend too much upon the inspirational powers of the teacher, that all real difficulties are carefully avoided, and that the very aim of all true education, to develop a strong character and to create self-activity and initiative, is thereby defeated.

During the past five years we have heard much of the social function of the school. Playgrounds, evening schools, social centers, school clubs, a multitude of new school activities, claim the attention of teachers and pupils. A prominent professor kindly informed us that until exercises in spelling, mental arithmetic, and formal grammar should have become merely incidental and subsidiary, the high-water mark in teaching would not have been reached. It is exaggerations of this sort that rob many otherwise excellent ideas of their legitimate influence and place upon them the stigma of the faddist.

A corollary of this new gospel of social efficiency is the new doctrine of mental discipline. Although not yet clearly formulated, its main contentions are: (1) That mental discipline as ordinarily conceived is a myth, in the sense that no "general training" is to be derived from the intensive study of one or more subjects, such as Latin, algebra, etc.; (2) that the disciplinary value of a subject is a function of the interest which it inspires and of the motive guiding the student; (3) that the cultural value of a subject depends on the extent to which that subject can be, and actually is, linked with the activities and the thought content of real life. In this way the old static, historic, idealistic conception of mental discipline is being replaced by a dynamic, realistic, practical view. (Cf. *Formal Discipline*, by C. J. C. Bennett, in *Teachers College Series*, Columbia University.)

It is not so much this new theory itself, as the hasty inferences drawn from it by superficial minds that we must regard as dangerous. In the first place, it requires no proof that the mere completion, however mechanical and stereotyped, of so much "prescribed" Latin or mathematics does not make an educated person. It is equally true that not all boys and girls find the old school subjects profitable, and for a certain number of them industrial or commercial studies are preferable. This proves nothing concerning the presence or absence of inherent disciplinary value in the present curriculum. The early and onesided introduction of professionalism, no matter how successfully managed, is always deplorable. Wherever it becomes imperative, it should be looked upon as a necessary evil.

For "it is difference in culture, far more than difference in wealth or position, which separates man from man, and class from class." The blending of liberal education and technical training is the supreme educational problem of our day. In Europe it has been solved by a differentiation of schools. America may have to follow that plan. Secondly, the new theory of discipline does not imply the cultural equivalence of all subjects. On the contrary, it demolishes that view completely. If it can be shown that mathematics can be linked with a larger range of actual thought processes and activities than typewriting or bookkeeping, for example, then the greater disciplinary value of mathematics will have been established. Hence, instead of crowding out the "old studies," the new conception of mental discipline simply gives a better criterion for testing their value and should have the effect of securing better training.

Last, not least, the mathematical curriculum has been affected powerfully by two other, mutually opposing, forces. The Perry movement, a direct outgrowth of the trend toward more practical mathematics, aims to abolish from the course all unnecessary details and to substitute experimental verification for logical deduction. On the other hand, the tremendous progress of scientific research, effected by men like Pasch, Peano, Klein, Hilbert, Veronese, Poincaré, has called attention to the many flaws in the logic of our textbooks and has given new impetus to the demand for genuine mathematical rigor.

GENERAL CAUSES OF FAILURE.

All these transforming influences if overlooked or ignored by the teacher may become prolific sources of failure. The constant shifting of the educational background demands on the part of the teacher sound judgment, quick insight, wide training, and the capacity for sane, conservative, readjustment. The new situation makes each educational factor both an active and a passive participant in the educational process. The latter distinction is important, as it should save many teachers from unnecessary discouragement. We shall proceed to examine briefly the principal educational factors as causes of failure, either in an active or in a passive rôle.

1. The Teacher.

Granted that the teacher meets all the obvious preliminary requirements, such as a strong and yet sympathetic personality, tact, enthusiasm, he nevertheless frequently becomes a serious cause of failure through any one of the following factors:

(1) *Lack of professional preparation.*—This is perhaps the most vital and distressing point of weakness in American secondary education. The only hopeful thing about it is that we are beginning

to feel this weakness. Much pounding was required to rouse us. At first it was the foreign critic, or the acclimated American, who put his finger on the sore. Who has not read Prof. Münsterberg's scathing criticisms? And now every number of the educational magazines sings the same melody. "Wanted—a teacher," exclaimed James H. Canfield, of Columbia University, 10 years ago (*Educational Review*, December, 1900). Some reported cases of professional ignorance seem almost incredible. Time was when everybody thought he could teach everything. This miserable Jacotot fallacy gradually dominated American education, because it harmonized so splendidly with the American spirit of self-activity and independence. Mr. E. George Payne, in a report published by the Kentucky Department of Education, 1909, tells of a young woman who planned to make her entire preparation to teach German in "one of the leading high schools" in Kentucky by spending six weeks on the subject at a summer school. Then he says, "I insist that 90 per cent of those attempting to teach the modern languages in the American schools, especially in the Kentucky schools, do not perform better work than this lady did in first-year German." (See *School Review*, June, 1910, p. 433.) Shocking, if true. New York State three years ago had only 32.2 per cent of college graduates among its 4,668 secondary teachers. This means that the remaining number had only the equivalent of a high-school education in mathematics. Their horizon was only a little above that of their pupils. How many high-school teachers of mathematics at the present day have ever studied analytics, not to speak of the calculus? How many have ever seen Crystal's Algebra, or Hilbert's Foundations of Geometry, or have read the pedagogical works of Smith or Young? All honor to the noble men and women who, in spite of serious handicaps, have done good work. But every effort should be made from now on by individuals and by schools to secure better professional equipment.

(2) *Lack of professional contact*.—Owing to the vast extent of the country it has been hard to develop esprit de corps outside of the big centers. Departmental organization in the large schools was the first step in the right direction. Associations of teachers soon followed, and any ambitious teacher can now make it possible to meet his colleagues at the educational gatherings. For those who can not go to these meetings the printed reports published in the new mathematical journals furnish a substitute. Lack of contact has been and still is a great source of stagnation. Let us hope it may speedily be removed.

(3) *Overwork*.—It need hardly be said that any teacher who has more than 25 periods a week of required work can not do that work effectively. Entirely indefensible is the practice of loading on a teacher three or four different subjects, especially if they are entirely

“out of her line.” Careless, half-hearted, indifferent teaching or incessant worry is the inevitable result in most cases. Many classes are altogether too large. We hear so much about individual instruction and personal attention and yet expect a teacher to inspire 40 young people at a time. So long as these conditions prevail to any considerable extent no improvement can follow.

(4) *Short and unstable tenure of office.*—Another very real source of failure: There is altogether too much shifting of positions. It takes several years to grow into a new position. A teacher who finds herself at a different school every two or three years can not expect to be of great service to that school. A very large number of teachers drop out every year, either to be married or to begin a different occupation. At the 1909 meeting of the American Association for the Advancement of Science Prof. William C. Ruediger, of George Washington University, presented the results of some investigations of the qualities of merit in teachers. He claimed that the best teachers had taught an average of *14 years* and the poorest *8 years*. No teacher who ranked first or second had taught less than 5 years. (See Science, for Apr. 15, 1910.) The shortness of the average teacher's service is due largely to the appallingly low salaries and to the uncertainty of tenure of office. Salaries often are not up to the standard of even the street laborer. No great improvement in teaching need be expected until we shall have (1) better salaries, (2) permanent appointment after a limited trial period, (3) a pension guarantee after a fixed term of service.

2. The Pupil.

So long as human nature is imperfect the problem of the pupil will remain with us, especially during the critical period of adolescence. However, many of the difficulties besetting the teacher would all but disappear if it were not for the following great causes of failure:

(1) *Immaturity.*—This is an entirely indefensible factor, in view of the work done in European schools by pupils of the same age. The enrollment of the Chicago public schools in January, 1909, showed the following arrangement of ages:

High school.	Ages.										Total.
	11	12	13	14	15	16	17	18	19	20+	
First-year pupils.....	2	45	708	2,291	2,104	1,045	257	60	14	19	6,555
Second-year pupils.....	0	2	47	467	1,236	1,062	532	159	27	14	3,546

(2) *Lack of preparation.*—A large majority of the teachers reporting to us emphasized this point. It seems that our elementary schools either find the problem of democratic education too big a

task or use methods that do not produce lasting results. A very large percentage of children do not complete the school course (Chicago, 1909: First grade, 38,239; eighth grade, 14,795).

(3) *Aimlessness*.—The "life-career motive," discussed by President Eliot at the 1910 meeting of the National Education Association, is becoming more essential in proportion as increased competition demands greater technical or professional equipment. Altogether too many pupils have no dominant purpose that might keep them at work. A moderate vocational tendency may prove a partial remedy, although it would be a grievous mistake to make vocational studies the sole basis of our secondary education.

(4) *Social diversions*.—Pupils must, of course, have a certain amount of relaxation. But many pupils have too much fun, too much athletics of the grand-stand type, too many social functions. They often develop the habits of grown-ups, become priggish, domineering, sluggish, and incapable of persistent effort. Lack of home training is responsible for much of this. A real educational crusade must be begun to convince parents of the necessity of careful moral and social training of their children. The increasing agitation against fraternities and athletics is a welcome indication of a sound reaction against the social evils of the high school.

3. High-School Organization.

The fact is that the high school has outgrown its present form of organization. It is sinning every moment against the law that two material bodies can not occupy the same space at the same time. It loses a tremendous number of its pupils (Chicago, 1909: First year, 6,555; fourth year, 1,467). Those who graduate have an education that must be pronounced both unsymmetric and superficial.

(1) *Lack of symmetry*.—This defect is apparent not only in the curriculum as a whole, but is felt in nearly every subject, especially in mathematics, history, and science. The average high-school graduate can at best solve an ordinary quadratic equation or analyze a simple geometric problem. The geometry of solids remains foreign to him, the most helpful trigonometric relations do not form part of his equipment, and, above all, he has not learned to apply his mathematics to the realities of life. This meager outfit, so laboriously acquired, is speedily lost because it is not broad enough to be of real use.

(2) *Lack of thoroughness*.—President Rush Rhees, of the University of Rochester, after a year abroad devoted to a careful inspection of European technical schools, stated at a recent educational meeting that lack of thoroughness is the most widespread defect of the educational work of our American schools. He said that the Amer-

ican educational system gives intellectual power, but fails to impart intellectual life, and that in practical work it fails with reference to methods of study. In mathematics all these defects become accentuated through the tandem system—first algebra, then geometry, then a year of complete interruption, then a review of entirely forgotten principles. A fairly good algebraic foundation may be laid in a year, but geometry most certainly requires more time. A comparison of the percentage of failures in elementary algebra and plane geometry in the tables of the appendix shows that geometry is less successfully taught than algebra, although the poorest pupils drop out at the end of the first year, thus leaving a smaller and more mature body of students.

The effort to make the elective system remedy these defects may be likened to an attempt to cure dyspepsia with liberal doses of olive oil. The digestive apparatus would probably function normally if proper mastication were not rendered impossible by too rapid and ill-arranged feeding. The group system, which is now being substituted for an excessive elective system, will secure greater thoroughness, but not necessarily greater symmetry. Hence, unless the principle of a cosmopolitan high school is to be given up and vocational schools are to take its place a different remedy must be found.

SPECIFIC CAUSES OF FAILURE.

Under this head we must limit ourselves to a brief consideration of the aim, the content, and the methods of secondary mathematics teaching.

Aim.—The one-sided doctrine of mental discipline must go. There need not be any antagonism between theory and practice. Neither Euclid alone nor Perry alone should be our guide. We ought to have a fusion of the abstract and the concrete, a fusion dictated by common sense and free from radicalism in either direction. A teacher who dwells exclusively on half-comprehended, nonproductive subtleties is as much to blame as one who emphasizes merely the How and not the Why. Real applications should be introduced systematically, but the acquisition of a satisfactory technique must not be allowed to suffer. Much of the indifference so often prevailing in mathematical classrooms would disappear if the teachers would take pains to make x and y talk realities and if they poured some life blood into the chimerical formulas of geometry.

Subject matter.—In very many classrooms the textbook or the syllabus of an examining body seems to be the only authority for the content and the relative prominence of the topics considered. Very many pupils fail to get the right point of view. In algebra the whole course must be built around two leading ideas, (1) the

equation as a means of stating and solving numerical relations, (2) the development of the number system. In geometry propositions should be arranged topically, and theorems having small inherent value or not serving as building stones for the whole system should be omitted. The teaching of incommensurables and limits will soon become optional. In all cases the "thought nodes" should stand out prominently in the pupil's mind. The course in secondary mathematics should not be a monotonous array of facts stretching away on an endless wire, but a landscape showing a few towering mountains and many connecting valleys.

Method.—A discussion of method is always dangerous, for here the experienced teacher considers himself on terra firma. It would be the height of conceit, however, not to acknowledge a connection between our poor results and our methods of instruction.

1. In the first place, our school hours should be periods of instruction, of actual thinking and doing, and not merely "recitations." There is no doubt that the "little red schoolhouse," with its insufficient equipment, is responsible for the plan of assigning lessons from a book without previous classroom discussion. In that little school such a practice was a deplorable necessity, since the one teacher in charge was not equal to the task of instructing many classes at once, or of mastering all the prescribed subjects. When the pupils had done their "studying," they were kept busy at the board or were given much written work to do. In this way the textbook and the blackboard gradually usurped the place of the teacher, who soon became a lesson-hearing automaton registering the "marks." That which at first had been a mere makeshift, finally crystallized, under the misunderstood maxims of Rousseau, Fröbel, Jacotot, into a national policy. For this system of teaching was supposed to give full play to the development of individual initiative, of self-activity, etc. Thus it seemed to meet all the requirements of an ideal education. Apparently it turned out self-made men—and it was cheap. How many slow pupils remained submerged forever was not determined. That this outgrowth of the pioneer days of the country should retain so much of its power in the modern high school is a new proof of the overwhelming influence of Anglo-Saxon conservatism. The grotesqueness of the idea becomes apparent when we imagine Socrates assigning a lesson from Homer to Plato or Aristotle.

2. The "recitations" should be less monotonous and less mechanical. The usual procedure consists in giving a brief explanation of the advanced lesson, then sending a large number of pupils to the board, where they consume from five minutes to a whole period. In geometry there is a little more variation. It has been said, to be sure, that mathematics must be written into the mind. But mechanical writing is useless. First the thought, then the symbol. How

little real thinking excessive written work often represents is proved by those pupils who get splendid marks in algebra but are put down as hopeless cases in geometry. The blackboard is a very valuable piece of furniture, but it should be reserved for reviews or snappy drill work. Some teachers have very good success with a system of cards, kept in a filing cabinet. These cards are given out to pupils for miscellaneous blackboard drill.

3. The class, and not the individual, should be the working unit. This is true because individual instruction is usually impossible. Training a class from the beginning to respond in a body makes for greater economy of effort, secures more uniform results, and leaves time for applied work and laboratory methods. This is the real secret of the excellent results obtained in many European schools. Every teacher of mathematics should read Prof. J. W. A. Young's "The Teaching of Mathematics in the Schools of Prussia." Two members of this committee in recent years made a personal comparative study of American and European schools, Mr. Betz in Germany and Miss Wardwell in England. A detailed account of the French system, from the American standpoint, was furnished to the Rochester section of the Association of Teachers in the Middle States and Maryland by Prof. Etzel, of Rochester, the latter having taught more than two decades in French secondary schools. The reports all agree in finding in European schools greater concentration of effort, as well as greater certainty and uniformity of good training, although these results are perhaps obtained at the expense of originality and spontaneity. The first thing that astonishes the American visitor is the small blackboard and the immense amount of oral work. A limited use of the Prussian method can be recommended unconditionally. A number of American teachers have tried it and speak highly of it.

And yet, no method can possibly take the place of a real enthusiastic teacher. The true teacher is an artist. He is ever watching for improvements. He is not dogmatic, but eclectic. The best thoughts of all ages and climes help him to wield an influence which, through his skillful leadership, produces a satisfactory harmony.

REMEDIES.

Throughout this report remedies have been considered in connection with the causes of failure. The remedies suggested in our questionnaire were all received favorably by the teachers except the first, which called for "more thorough teaching by taking more time, e. g., six-year curriculum." Only a small number expressed an opinion in regard to it, thus indicating that the plan is not sufficiently clear.

At the risk of some repetition we propose the following additional remedies:

I. *A six-year curriculum, to begin at the end of the present sixth grade.*—Not a single valid objection can be urged against the plan. The present cramped curriculum seriously interferes with—

- (1) The right sort of approach to each subject.
- (2) Thoroughness of assimilation.
- (3) Permanence of impressions.
- (4) Applications of vital interest to pupils.
- (5) The coordination and proper sequence of studies.

Many other reasons may be presented why we need more time than formerly. The following list might easily be extended:

- (1) We must get away from mechanical textbook teaching.
- (2) The prevalence of laboratory methods consumes more time. The spirit of discovery is inconsistent with machine routine.
- (3) The old curriculum paid almost no attention to the demands of actual life. It ignored applications.
- (4) The requirements of the higher institutions and of the professions are becoming more intensive and extensive.
- (5) The complexity of modern life furnishes so many distractions to the young student that more thorough teaching and more reviews are necessary than formerly.

The plan has been tried in some American cities. For a detailed account we must refer to the report of subcommittee 8. The six-year curriculum seems to solve many of our difficulties. All possible objections should be removed by considerations such as the following:

1. It has been tried in Europe. In England, France, and Germany secondary education begins much earlier, usually at the age of 9. This long-continued, unified period of instruction, administered by carefully prepared teachers, is primarily responsible for the supremacy of Europe in science and—perhaps—in foreign commerce. Excellent accounts of the Prussian system may be found in the above-named book of Prof. Young, and in Prof. Klein's *Vorträge über den Mathematischen Unterricht an den höheren Schulen* (Leipzig, 1907). A brief résumé of present-day teaching of geometry in Europe and America is given in A. W. Stamper's "A History of the Teaching of Elementary Geometry" (Teachers College, Columbia University, 1909). The German high-school boy, in the three types of secondary schools, is given a total of 1,360, 1,680, 1,880 hours, respectively, of unified mathematical instruction. This work is compulsory, and all but the first two or three years of it corresponds to secondary mathematics in our country; so that 960, 1,280, 1,480 hours, respectively, are given to secondary mathematics. Plane geometry extends over a period of from five to six years; solid geometry over a period

of four years; trigonometry, four years; algebra, six years.¹ Compare with this our less than 200 algebra periods and 200 geometry periods. A pupil who takes four years of mathematics in our high schools gets a maximum of less than 800 periods of instruction, while the German minimum is 960.

2. A six-year curriculum will secure closer contact with the elementary schools.

3. There is no reason why our educational system should not consist of three periods of equal length—primary (6–12), secondary (13–18), higher (19–24).

4. In a more extended secondary course it will be easier to discover a pupil's special aptitudes.

5. The proper psychological moment for teaching certain subjects, e. g., modern languages, can be utilized.

6. An increasing number of pupils find it impossible to complete the present course in four years. Instead of compelling them to fail and drop out, we could adapt the work better to their capacity.

7. The six-year curriculum offers the only hope of overcoming the tandem system. All efforts to secure unified mathematical instruction have been useless under existing conditions.

II. The mathematics teachers of the future must lay a much broader foundation in their own preparation. No candidate lacking a knowledge of the rudiments of trigonometry, analytics, the calculus, and elementary mechanics, ought to be appointed to a high-school position in mathematics. A familiarity with surveying and shop work is also very desirable. Salaries must be made sufficiently high to justify this increased requirement.

III. There must be more expert supervision. This should not be of the nature of petty fault-finding, but should be administered with a spirit of cooperation and inspiration. The experience of other countries justifies the belief that this is a much more effective method of stimulating teachers to better efforts than our periodic examinations, which frequently seem to be narrow and pedantic, and to select incidentals rather than essentials.

CONCLUSION.

It should not be forgotten that many of our educational troubles are fundamentally due to weaknesses in human nature. Hence our aim in this report has been to avoid mere bickering and to retain a broad outlook upon the educational situation in its entirety. Whether we have succeeded in this or not we must leave to the judgment of the reader.

¹ It is of course necessary to remember that ordinarily four weekly periods are devoted to unified mathematics, not to algebra or geometry alone.

APPENDIX.

REPORTS OF REGENTS EXAMINATIONS.

TABLE I.—*Examination of papers.*

Subject.	Papers examined.	Papers passed.	Percentage passed.
<i>1898.</i>			
English, first year.....	2,561	1,116	43.6
Latin, first year.....	10,451	5,901	56.5
Elementary algebra.....	15,166	10,543	69.5
German, first year.....	5,382	3,936	73.1
Cæsar.....	4,351	3,264	75.0
Geometry.....	9,028	4,908	54.4
<i>1899.</i>			
English, first year.....	3,424	1,554	45.3
Latin, first year.....	10,293	5,853	56.9
Elementary algebra.....	14,234	8,784	61.7
German, first year.....	5,895	4,641	87.7
Cæsar.....	4,578	3,343	74.8
Geometry.....	10,112	6,007	59.4
<i>1900.</i>			
English, first year.....	4,974	2,435	49.0
Latin, first year.....	11,312	6,351	56.1
Elementary algebra.....	16,320	10,226	62.7
German, first year.....	6,582	4,542	69.0
Cæsar.....	5,198	2,854	54.9
Geometry.....	9,958	5,048	50.7
<i>1901.</i>			
English, first year.....	6,484	3,156	48.7
Latin, first year.....	11,887	6,885	57.9
Elementary algebra.....	17,085	10,895	63.8
German, first year.....	6,977	4,536	65.0
Cæsar.....	6,361	4,610	72.4
Geometry.....	11,067	6,656	60.1
<i>1902.</i>			
English, first year.....	8,878	4,549	51.2
Latin, first year.....	12,185	7,565	62.1
Elementary algebra.....	18,416	13,380	72.7
German, first year.....	7,368	5,228	71.0
Cæsar.....	6,160	4,293	69.7
Geometry.....	11,030	6,671	60.5
<i>1903.</i>			
English, first year.....	10,823	5,568	51.5
Latin, first year.....	11,848	7,899	66.7
Elementary algebra.....	17,148	10,944	63.8
German, first year.....	7,146	4,303	60.2
Cæsar.....	6,807	4,702	69.1
Geometry.....	11,970	6,941	58.0
<i>1904.</i>			
English, first year.....	12,957	8,250	63.7
Latin, first year.....	11,997	7,091	59.1
Elementary algebra.....	17,773	11,672	65.7
German, first year.....	7,882	5,506	69.9
Cæsar.....	7,044	4,880	69.3
Geometry.....	11,697	7,296	62.4
<i>1905.</i>			
English, first year.....	15,370	8,737	56.8
Latin, first year.....	12,490	6,409	51.3
Elementary algebra.....	18,717	12,005	64.1
German, first year.....	8,286	5,431	65.5
Cæsar.....	7,247	4,269	58.9
Geometry.....	12,575	6,998	55.7

TABLE I.—*Examination of papers—Continued.*

Subject.	Papers examined.	Papers passed.	Percentage passed.
<i>1906.</i>			
English, first year.....	17,758	10,920	65.1
Latin, first year.....	11,642	6,776	58.2
Elementary algebra.....	19,772	14,187	71.7
German, first year.....	7,473	5,384	72.1
Cæsar.....	7,277	5,430	74.6
Geometry.....	11,262	5,825	51.7
<i>1907.¹</i>			
English, first year.....	13,186	.....	68.6
Latin, first year.....	8,509	.....	60.9
Elementary algebra.....	16,380	.....	84.5
German, first year.....	4,819	.....	86.1
Cæsar.....	5,613	.....	79.0
Geometry.....	7,994	.....	78.8
<i>1908.</i>			
English, first year.....	21,202	.....	62.3
Latin, first year.....	13,977	.....	56.0
Elementary algebra.....	26,426	.....	64.2
German, first year.....	8,521	.....	84.0
Cæsar.....	11,629	.....	60.3
Geometry.....	16,805	.....	62.4
<i>1909.</i>			
English, first year.....	26,335	.....	80.0
Latin, first year.....	17,641	.....	62.0
Elementary algebra.....	31,639	.....	74.4
German, first year.....	9,716	.....	74.4
Cæsar.....	12,776	.....	73.1
Geometry.....	18,562	.....	64.3

¹ In this year transition was made from pass mark 75 per cent to 60 per cent.

TABLE II.—*Summary of pre-academic and academic examinations, 1894-1904.*

	1894	1895	1896	1897	1898	1899
Schools.....	417	467	517	557	608	639
Papers.....	371,876	405,557	419,802	445,235	470,471	508,841
Per cent passed.....	59	60	57	57	61	61
	1900	1901	1902	1903	1904	
Schools.....	672	699	726	730	751	
Papers.....	543,765	538,833	558,301	539,241	564,889	
Per cent passed.....	67	66	69	66	70	

TABLE III.—*General averages, in percentages.*

Subjects.	1907	1908	1909
English.....	70.4	74.4	81.1
German.....	84.7	75.7	67.5
French.....	67.5	77.5	68.8
Latin.....	67.8	55.7	67.4
Greek.....	83.5	68.9	80.4
Mathematics.....	81.4	66.8	69.8
Science.....	87.0	81.1	77.9
History.....	66.8	72.1	75.7
Commercial.....	62.9	69.0	67.8
Business arithmetic.....	25.3	37.8	28.1
	(408 papers.)	(1,378 papers.)	(1,853 papers.)

TABLE V.—*Reports of college entrance examination board.*

Subjects.	1903	1905	1906	1907
English, papers examined.....	1,857	2,336	2,521	2,996
Passed, 60-100 per cent.....	72.5	42.7	59.3	58.6
History, papers examined.....	1,068	1,324	1,370	1,671
Passed, 60-100 per cent.....	53.2	54.0	47.3	43.2
Latin, papers examined.....	3,860	5,066	5,693	6,101
Passed, 60-100 per cent.....	49.4	62.8	49.9	47.9
Cæsar, papers examined.....	414	598	670	698
Passed, 60-100 per cent.....	61.4	74.1	61.3	53.6
German, papers examined.....	964	1,235	1,260	1,629
Passed, 60-100 per cent.....	68.1	67.6	60.8	75.3
Elementary German.....	632	778	853	1,082
Passed, 60-100 per cent.....	68.4	72.6	64.6	64.3
Mathematics, papers examined.....	3,860	3,000	3,327	3,851
Passed, 60-100 per cent.....	57.6	48.1	63.9	58.9

TABLE VI.—*Percentage of accepted papers, 1901-1907.*

Ratings.	1901	1902	1903	1904	1905	1906	1907
60-100 per cent.....	59.3	55.9	58.2	60.1	56.2	55.7	53.3

Conclusions and criticisms.—Concerning the figures of Table VI, Dr. Thomas S. Fiske, the secretary of the board, says:

From an examination of this table it would appear that we must make one or more of the following three inferences—

- (1) The question papers set by the board are steadily becoming more difficult.
- (2) The board's readers are rating the answer books submitted by candidates with steadily increasing severity.
- (3) As the number of candidates examined by the board increases, the quality of the average candidate's preparation is steadily deteriorating.

COMMITTEE NO. IV. MATHEMATICS IN THE PRIVATE SECONDARY SCHOOLS OF THE UNITED STATES.

PLAN OF THE INVESTIGATION.

Membership of the committee.—The following study of the teaching of mathematics in the private secondary schools of the United States has been made by a committee consisting of the chairman and three other members, each of whom has had the assistance of a subcommittee in dealing respectively with boys' schools, girls' schools, and coeducational schools. The field assigned to the committee includes schools connected with religious organizations and preparatory departments of colleges, but not special schools such as trade schools and schools for defectives.

The members of the subcommittee were selected with view to including representatives of various types of schools and, to some extent, of different sections of the country.

Method of collecting the data.—The only publications to which the committee has found it desirable to refer are the annual reports of the United States Commissioner of Education, from which statistics in regard to organization of schools have been taken. At the beginning of the investigation catalogues of several hundred schools were examined without finding anything of value for the purpose in hand. As the private schools in the United States are subject to no centralized control, no comprehensive view of their organization or of the character of their work could be obtained except by applying to the schools themselves for the information. The method of the questionnaire seemed to be the only one available.

A questionnaire, referred to in the report as the principal questionnaire, was sent, by the United States Commissioner of Education, in behalf of the committee, to all the schools of the country¹ within the committee's field. A supplementary questionnaire covering additional topics was sent by the committee to a limited number of schools selected so as to include different types, sizes, and locations.

¹ The expression "all the schools," used frequently in the report, means all the schools in the records of the United States Commissioner of Education.

Preparation and character of the report.—The returns from the questionnaires were studied by the subcommittees, and reports were prepared by the chairmen. Separate reports upon the fields represented by the subcommittees would involve so much repetition that it has seemed best to combine all the data in a single report, indicating, whenever an important distinction appears, the variation in the practice of the different types of schools.

The greater part of the report is devoted to a statement of the general conditions of mathematics teaching in the private secondary schools of the country. The general plan outlined by the commissioners included, besides a description of present conditions, a statement of progressive movements. This second phase of the investigation was not neglected in planning the questionnaires, but very meager replies were received in answer to requests for criticisms of prevailing methods and recommendations for improvement. The committee has therefore concentrated its attention upon that part of the plan which it understood to be of first importance, and for which reliable data could be secured within the controlling limits of time and expense. The report, then, is for the most part a statement of common-place facts, whose purpose is to give a correct view of the general situation. Obviously it is impossible within reasonable limits of space to give a complete statement even of the facts in hand, but in condensing the data special effort has been made to avoid misleading statements. With this in view the record of the general practice with regard to any feature of mathematics teaching is commonly amplified by a description of the variation from this central tendency.

Of course such a statistical summary of the situation as that described in the preceding paragraph can not reflect the spirit of the work which is being done in the schools. Indeed, the reader may gain the impression that the teaching in the private schools is mechanical and unprogressive. As a partial offset to such an impression a few brief statements of distinctive features of the work in their own schools have been contributed by members of the committee and other directors of mathematics. These statements are quoted in full at the end of the report.

EXTENT AND CHARACTER OF THE DATA.

The principal questionnaire.—The principal questionnaire brought, in time for use in the report, replies from 418 schools, or 23 per cent of all the schools in the country belonging to the field to be studied. The numbers of replies representing different types of schools and the percentage of the total numbers of the schools of the various types are as follows:

Type of school.	Number of replies.	Percentage of all schools of the type.
Preparatory departments of colleges—		
For boys.....	25	.....
For girls.....	20	.....
For both sexes.....	47	.....
Total.....	92	19
Independent secondary schools—		
For boys.....	98	35
For girls.....	94	26
For both sexes.....	134	20
Total.....	326	25
Roman Catholic schools.....	59	16
Other religious schools.....	94	24
Nonsectarian schools.....	173	32
In New England ¹	68	33
Middle Atlantic States.....	93	30
South Atlantic States.....	42	20
South Central States.....	28	14
North Central States.....	78	27
Western States.....	17	18

¹ The States constituting these various groups are:

New England States: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

Middle Atlantic States: New York, New Jersey, Pennsylvania.

South Atlantic States: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida.

South Central States: Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Arkansas, Oklahoma.

North Central States: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

Western States: Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Idaho, Washington, Oregon, California.

The number and percentage of replies with regard to nearly every group of schools referred to would be large enough to give a satisfactory indication of the general character of all the schools of the group, if the schools replying were selected at random. It is natural to suppose that a larger percentage of schools of high grade, than of less efficient schools, would respond to the questionnaire, but it is impossible to say to what extent this supposition is justified. A slight clue to the representative character of the returns may be gained by comparing the size (number of pupils) of the schools reporting with the average size of all the schools. The average enrollment for all the independent private secondary schools for the year 1908-9 is given in the latest published report of the United States Commissioner of Education. As the statistics reported in returns to the questionnaire are for the year 1909-10, the figures are not strictly comparable, but any marked tendency toward the exclusion of the smaller schools would be evident by such a comparison. The respective average enrollments of the reporting schools and of all the schools included in the commissioner's report for 1909 are—for

boys' schools 93 and 82, for girls' schools 62 and 60, and for coeducational schools 91 and 75.

The correspondence between the two sets of figures, taken with the fact that the reported enrollments exhibit a very wide variation, indicates that, while the smaller schools are somewhat less generally represented than the larger ones, a fairly true picture of the general tendency and variability in this one respect may be gained from the reports. The figures in regard to many other details of organization indicate such definite tendencies, with such regular variation toward the extreme values, that they, too, would seem to be fairly representative.

The supplementary questionnaire.—The supplementary questionnaire brought about one-third as many replies as the principal questionnaire. The coeducational schools were poorly represented, and the proportion, as well as number of schools from the North Atlantic States, was much higher than for other sections of the country. The replies include only four Roman Catholic schools and very few preparatory departments of colleges. The proportion of very small schools is much lower than in the returns to the principal questionnaire.

The data obtained from the supplementary questionnaire should not, therefore, be regarded as representative to the same degree as that of the principal questionnaire. The replies to questions of opinion are valuable only as indications of the consensus and variation of opinion among teachers representing chiefly the larger schools in the more populous and wealthy sections of the country.

Following are the numbers of replies from the various groups of schools:

Boys' schools.....	43	Schools situated in—	
Girls' schools.....	59	New England States.....	31
Coeducational schools.....	37	Middle Atlantic States.....	51
		South Atlantic States.....	13
Total ¹	139	South Central States.....	11
		North Central States.....	27
Religious schools.....	58	Western States.....	4
Nonsectarian schools.....	79		

Other sources of inaccuracy.—Many replies to both questionnaires were incomplete and some were obviously incorrect. In general, ambiguous answers and those indicating a misunderstanding of the question have been excluded. In the presentation of each topic is given the number or proportion of the replies upon which the statement is based.

In order to reduce the labor of filling out the questionnaire blanks, many questions were so presented that answers could be given by crossing out items from a list of possible replies. Where the items

¹ Two anonymous reports could not be included in the classifications according to location and religious connection.

given are not alternatives, this method is likely to cause error through the failure of the reporting officer to cross out every inappropriate item. Note of this source of inaccuracy is made in the presentation of topics in which it is pertinent.

ORGANIZATION OF PRIVATE SECONDARY SCHOOLS.

*Types of schools.*¹—During the Colonial period the American secondary schools were "Latin Grammar Schools," whose function it was to prepare boys for college. During the first half of the nineteenth century the typical secondary school was the academy. It was only incidentally a preparatory school and furnished a broad general course of study. Many of these schools were endowed, and a low tuition fee, or in some cases free tuition, made it possible for children from families in moderate circumstances to attend. Some of the academies were for boys, others—usually called "female seminaries"—for girls, but many were coeducational. They usually provided for boarding students. Many of them were under the control of religious bodies. With the rapid development of the public high schools during the latter half of the nineteenth century, many of the academies ceased to exist or were transformed into public schools. Others became more distinctively preparatory schools.

The private secondary schools of the present day include the following fairly well-marked types: (1) The surviving academies and other more recently organized schools of the same type, including many of the schools connected with religious organizations. (2) Private schools having relatively high tuition fees, usually for one sex. The cities, especially those in the North Atlantic States, usually have day schools of this grade. The boarding schools are ordinarily in the country or in small towns. (3) Preparatory departments of colleges. (4) Secondary departments of elementary schools, including many Roman Catholic schools for girls. There are also a few large, finely equipped coeducational schools maintained in connection with the departments of education of some of the larger universities, or supported by other organizations for the purpose of contributing to progress in education.

Classification of schools according to sex of pupils.—Of the 1,301 independent private secondary schools reporting for the year 1908–9 to the United States Commissioner of Education, 21 per cent were for boys only, 28 per cent for girls only, and 51 per cent were for both sexes. Of 422 preparatory departments of colleges (not including those under State control), 21 per cent were for boys, the same percentage for girls, and 58 per cent were coeducational.

¹ The first paragraph is based upon a monograph on Secondary Education by Elmer Ellsworth Brown in a series of monographs on Education in the United States, edited by Nicholas Murray Butler, Albany, 1900. The second paragraph is based upon the author's observation, combined with returns from the questionnaires.

Geographical distribution.—The Middle Atlantic and the North Central sections have each about 300 of the independent schools. New England, the South Atlantic, and the South Central sections have each about 200, and nearly 100 schools are in the Western States. The proportion of boys' schools is relatively high in the eastern part of the country, and that of the girls' schools in the North Central and Western States. About half of the schools in each section of the country are coeducational, except in the South Central and Western States, where the coeducational schools form, respectively, 65 per cent and 34 per cent of the total. Practically none of the New England colleges have preparatory departments, and there are comparatively few in the middle Atlantic States. In the other sections of the country, however, the colleges commonly have such departments, and in the North Central States alone there are 180 of them. A majority of these preparatory departments are coeducational, but in the Southern States there are many connected with colleges for women.

*Religious connection.*¹—Twenty-nine per cent of the independent private secondary schools are controlled by the Roman Catholic Church, and 30 per cent are connected with other religious denominations. Thirteen per cent of the preparatory departments of colleges are Roman Catholic and 69 per cent are connected with other churches. Two-thirds of the schools in New England are nonsectarian, while in other sections of the country the majority are religious schools. The Roman Catholic schools for girls are very numerous in the Central and Western sections, forming 70 per cent of all the girls' schools in that region. A majority of the Roman Catholic schools for boys are connected with colleges; 50 of the 88 preparatory departments for boys are Roman Catholic. Sixty per cent of the independent schools and 70 per cent of the preparatory departments connected with other religious denominations are coeducational.

Day schools and boarding schools.—Of 404 schools reporting on this point in answer to the principal questionnaire, 31 per cent are day schools, 10 per cent boarding schools, and 59 per cent take both day and boarding pupils. The same order holds in all three classes of schools (boys', girls', and coeducational) and in all sections of the country; that is, the greatest number take both day and boarding students, and the schools for boarders only are least numerous. There are very few schools for day pupils only in the South and West.

Age of schools.—Three hundred and eighty-eight schools replying to the principal questionnaire gave the date of establishment (or that of the secondary department). (See fig. 1.) The ages range from 1 year to 265 years, a few of the oldest preserving the name "Grammar School." Twenty-one of the schools are over 100 years old, includ-

¹ It is safe to say that many schools reported as religious schools are subject to no control by religious organizations. We have no means of separating these schools from those properly classified as religious institutions.

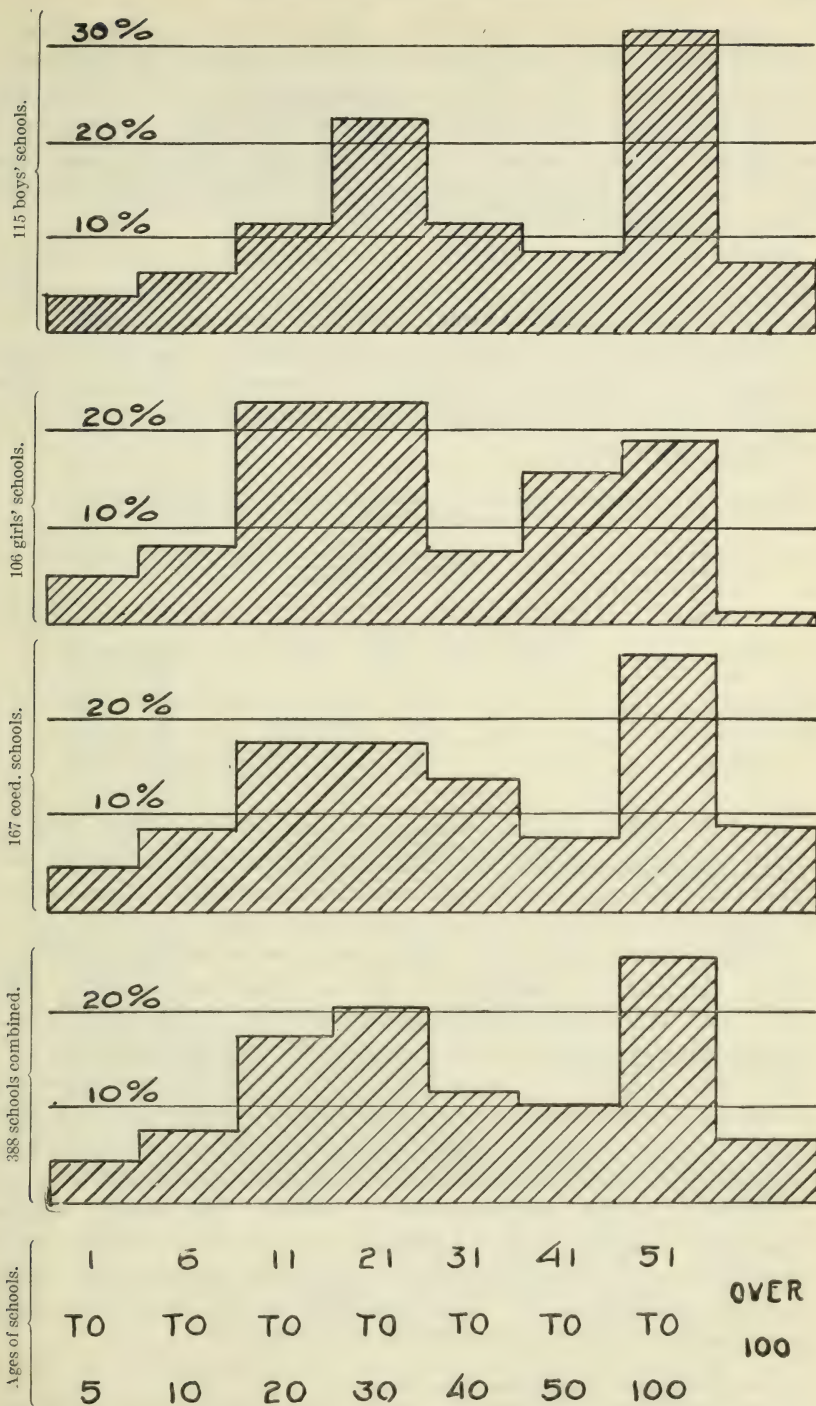


FIG. 1.—Ages of schools; percentage distribution.

ing some of the oldest academies. Only 16 have been established within 5 years. The median age of the boys' schools lies between 40 years and 50 years, that of the coeducational schools between 30 and 40, and that of the girls' schools between 20 and 30. Thirty-seven per cent of the boys' schools and 34 per cent of the coeducational schools are over 50 years old, while only 19 per cent of the girls' schools are as old as this.

Number of pupils.—In 1908-9¹ the average enrollment in the independent private secondary schools was, in boys' schools 82, in girls' schools 60, and in coeducational schools 36 boys and 39 girls. The variability in the size of schools may be judged from the following table based on 345 replies, although the average enrollment in these schools is about 18 per cent higher than that of all the schools referred to above. (See fig. 2.)

Distribution of 345 schools, including preparatory departments of colleges, according to number of pupils.

Schools.	Enrollment.							Total number of replies.
	More than 500	401 to 500	301 to 400	201 to 300	101 to 200	51 to 100	50 or less.	
Boys' schools.....	.....	1	3	7	24	30	36	101
Girls' schools.....	.....	.....	.....	1	11	23	45	80
Coeducational schools.....	2	1	6	12	44	33	66	164
All schools.....	2	2	9	20	79	86	147	345

The two largest schools, which have respectively 1,048 and 580 pupils, are both coeducational day schools and are connected with higher institutions, situated in one of the largest cities in the country. The largest boys' school, with an enrollment of 500, is an independent secondary school—one of the old academies—located in a small town in New England and taking both day and boarding students. The largest girls' school reporting its enrollment has 216 pupils. It is an independent day school in a New England city of moderate size.

It will be noticed that more than half of the girls' schools and 42 per cent of all schools had not more than 50 pupils each. Eighty-five per cent of the girls' schools had not more than 100 pupils each, and in 90 per cent of all the schools the enrollment was not over 200.

Number of pupils per teacher.—In 1905-6² the average number of pupils per teacher in all the independent private secondary schools was as follows: For girls' schools 6.9, for boys' schools 10.4, and for coeducational schools 14. The variability of the number of pupils to one teacher for 342 schools³ is shown below.

¹ Report of United States Commissioner of Education, 1909.

² Report of the United States Commissioner of Education, 1906. This is the most recent report giving detailed statistics of secondary schools.

³ Data of principal questionnaire.

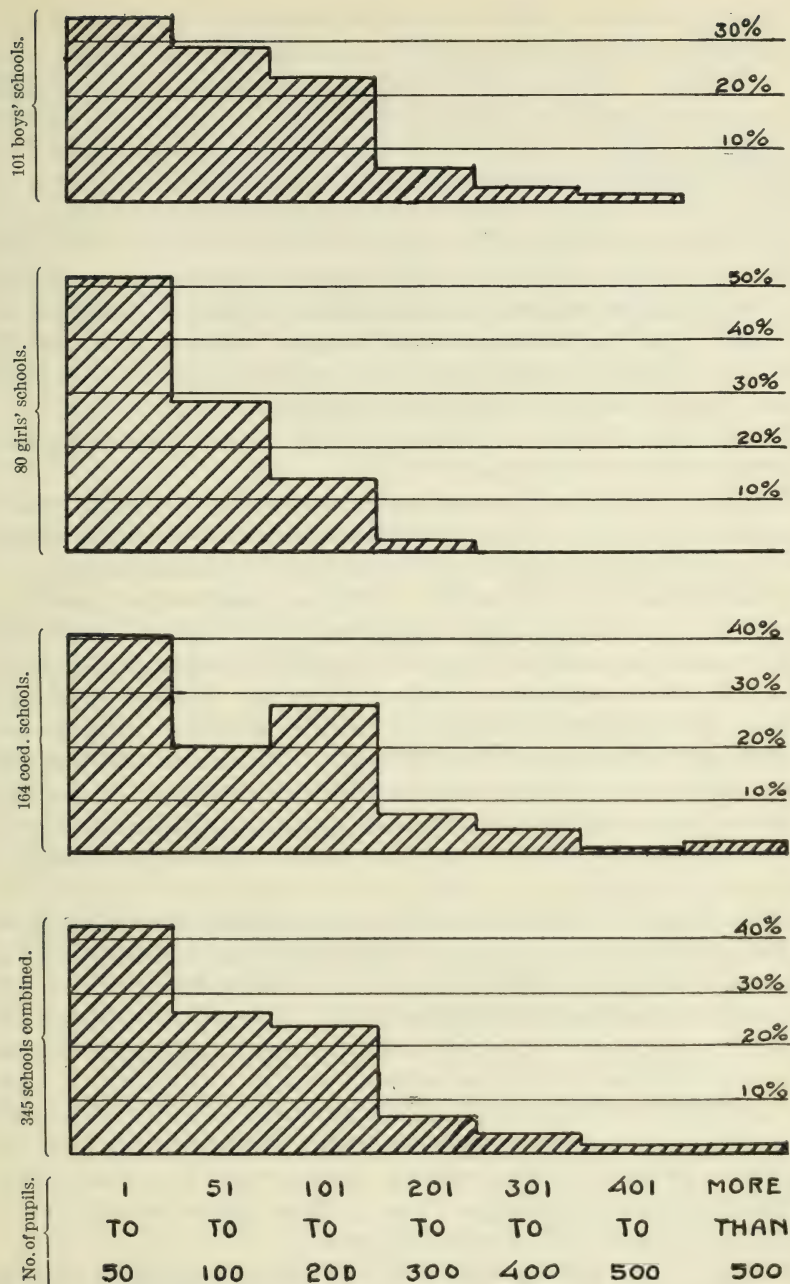


FIG. 2.—Sizes of schools; percentage distribution.

Number of pupils per teacher.

Schools.	46 to 50	41 to 45	36 to 40	31 to 35	26 to 30	21 to 25	16 to 20	11 to 15	6 to 10	5 or less.	Total number of reports.
Number of boys' schools.....					3	6	10	32	42	12	105
Number of girls' schools.....						2	7	15	37	25	86
Number of coeducational schools.....	2	3	2	2	5	15	27	57	31	7	151

Eighty-two per cent of the boys' schools and 90 per cent of the girls' schools have not more than 15 pupils per teacher, while only 63 per cent of the coeducational schools come within this limit. The nine coeducational schools in which the ratio is higher than 30 pupils to one teacher are nearly all in the Southern States.

Length of school year.—The length of the school year as reported by 407 schools is as follows:

With the exception of one school which has only a single year of secondary work, the minimum school year was 25 weeks in a small coeducational day school in New York City. The maximum reported by three schools was 42 weeks. Sixty-four per cent of the boys' schools, 50 per cent of the girls' schools, and 87 per cent of the coeducational schools have a year of from 36 to 40 weeks. All but 13 out of 407 schools have more than 30 weeks. Most of the schools with a very short year are girls' schools in the East. The Roman Catholic schools commonly have 40 weeks. The school year is shorter in the East than in the Central and Western sections; 41 per cent of the eastern schools have a year of 35 weeks or less, while in the rest of the country only 15 per cent of the schools reporting have so short a year.

Connection with other departments.—Among the 418 schools replying to the questionnaire, elementary departments are maintained by 60 per cent of the boys' schools, 79 per cent of the girls' schools, and 44 per cent of the coeducational schools. In boys' schools the elementary department is as a rule relatively small, and in girls' schools and coeducational schools the same is true in a majority of cases, but many of the Roman Catholic schools for girls and for both sexes have large elementary departments, with comparatively few secondary students. As already stated, 22 per cent of the schools replying are connected with colleges. Besides these, about one-sixth of the schools give some work of collegiate grade.

Courses of study.—Practically all the schools offer college preparatory courses. About 20 per cent of all the schools offer only a single course—usually planned to meet college requirements—although some choice of studies within this course is often allowed. This practice (single course) is commonest in boys' schools and least common in girls' schools. A more general plan is to offer two courses, a

college preparatory course and either a scientific course, a general course, or a commercial course. Many schools differentiate more widely, offering three, four, or even five courses. In 1908-9,¹ 29 per cent of the boys and 10 per cent of the girls enrolled in independent private secondary schools were preparing for college. A majority (53 per cent) of these boys were in scientific courses, while 71 per cent of the girls were in classical courses. Sixty-one per cent of the boys and 23 per cent of the girls in the graduating classes intended to enter college. Commercial courses are given in comparatively few (about one-fifth) of the girls' schools. Most of the Roman Catholic schools for boys give commercial courses, and a relatively large proportion of the Roman Catholic schools for girls give such courses.

Except for commercial students, four years is ordinarily the length of the secondary course, pupils entering at about 14 years of age. About an equal number of schools—7 or 8 per cent of all—have courses of three years and five years, respectively, and a few schools make six years the normal period. The schools whose courses are longer than four years usually admit pupils at an earlier age than the others, or give work in advance of the requirements for admission to college. Among the schools which maintain elementary departments there may be little real distinction between those which report a secondary course of six years and those which label only four of those years "secondary." Commercial courses vary in length from one to four years. In the boys' schools four years is the common length, and in girls' schools two years, while in the coeducational schools courses of four years and two years are about equally common.

Number and sex of teachers.—In 1905-6² the average number of teachers per school was, for boys' schools 7.2, for girls' schools 7.8, and for coeducational schools 5.1. In each case the average is smallest for the South Central States. It is largest for the Middle Atlantic States, except in coeducational schools, in which the Western States give the highest average. The variability in the number of teachers per school, among 327 schools,³ is as follows:

Percentage distribution of 327 schools according to number of teachers.

	Number of teachers.					Total number of schools included.
	More than 20.	16 to 20.	11 to 15.	6 to 10.	5 or less.	
Percentage of boys' schools.....	6	5	8	53	28	89
Percentage of girls' schools.....	1	5	19	39	36	85
Percentage of coeducational schools.....	3	5	9	36	47	153

¹ Report of United States Commissioner of Education, 1909.

² Data of principal questionnaire

³ *Ibid.*, 1906.

The maximum number of teachers reported for the secondary department of any one school was 21 for girls' schools, 38 for boys' schools, and 54 for coeducational schools. Several of the coeducational schools report only one teacher. Eight per cent of all the schools reporting have more than 15; 80 per cent have not more than 10.

In 1905-6,¹ 93 per cent of the teachers in boys' schools were men; 93 per cent in girls' schools were women; while in the coeducational schools 54 per cent were women.

THE DEPARTMENT OF MATHEMATICS.

Number and sex of mathematics teachers.—In the replies to the principal questionnaire, about 90 per cent of the boys' schools and coeducational schools and 75 per cent of the girls' schools gave lists of their teachers of mathematics with the courses taught by each teacher. The records of about 800 teachers are included in these reports.

In the boys' schools practically all the classes in mathematics are taught by men, in the girls' schools 93 per cent of the teachers are women, while in the coeducational schools 63 per cent are men.

In about one-third of the schools reporting, the work in secondary mathematics is done by a single teacher, who, as often as not, teaches other subjects also. Several of the large boys' schools have as many as eight teachers giving all their time to mathematics.

Teachers' assignments.—About 30 per cent of the teachers teach only mathematics and give at least two hours a day to teaching. About 60 per cent are reported as teaching other subjects also. In the remaining cases, only mathematical courses are listed, but, as only one or two courses are assigned to each teacher, it is probable that many of these teachers have other teaching assignments which were not recorded. In the Roman Catholic schools it is the common practice to divide the work in mathematics among several teachers, each of whom teaches several other subjects.

In the list of subjects other than mathematics assigned to mathematics teachers, every subject in the curriculum appears. Those most frequently mentioned are, in order: Natural science (especially physics), Latin, modern languages, and commercial subjects.

About one-eighth of the teachers have classes in mathematics in elementary or collegiate departments as well as work of secondary grade.

The returns giving the amounts of time required of teachers in teaching and in other school duties are not sufficiently reliable to warrant a quantitative statement. They indicate a very wide variation, some teachers giving only a single course while others are reported as teaching an incredible number of hours. As illustrations

¹ Report of United States Commissioner of Education, 1906.

of practice, in some of the well-known schools, whose reports were evidently made with care, the following figures are given, but it is not intended to imply that they are typical:

Schools.	Number of minutes of teaching.	Number of minutes of other duties.
1. A boys' boarding school in Pennsylvania.....	675 to 950 (average, 876).	400 to 1,150 (average, 690).
2. A boys' day school in New York City.....	1,200 to 1,400 (average, 1,270).	250 to 460 (average, 390).
3. A girls' boarding school in California.....	765	460.
4. A girls' day school in Massachusetts.....	640 to 960 (average, 800).	465 to 785 (average, 625).
5. A coeducational boarding school in Ohio.....	1,200 to 1,380 (average, 1,280).	None required.
6. A coeducational day school in Chicago, Ill.....	1,000 to 1,250 (average, 1,050).	None.

Teachers' salaries.—About 60 per cent of the replies from boys' schools and coeducational schools reported facts in regard to the salaries of mathematics teachers doing secondary work. Only 44 per cent of the girls' schools reported salaries. The reports from Roman Catholic schools, with very few exceptions, stated that their teachers receive no salaries, but are supported by the religious orders to which they belong.

The questionnaire called for maximum, minimum, and average salaries in order to secure data on the variation within the schools which have several teachers. In some cases the maximum only was given, in some the minimum, and in others the average. Some of the replies showed that the question was understood to call for variation in a single teacher's salary according to the schedule of salaries in force in the school.

The figures, therefore, are probably not as reliable as most of the data presented. They will serve, however, to indicate in a general way the distribution of salaries in different types of schools and in different sections of the country. In the following figures the salaries of principals who are also teachers of mathematics, and those of teachers receiving board as a part of their remuneration, have been excluded. (See fig. 3.)

In the boys' schools, the salaries reported vary from \$50 per month to \$2,700 per year. Ten schools reported a maximum salary of \$2,000 or over. Of the 39 schools reporting an average salary or the salary of a single teacher, 25 reported sums lying between \$600 and \$1,200, and the rest, with one exception, between \$1,300 and \$2,000.

In the girls' schools, the lowest salary reported was \$40 per month. Only one school—a day school in New York City—gave a sum higher than \$1,200. In this the maximum is \$2,000. Sixteen of the 30 schools which report an average salary place this between \$700 and \$1,000.

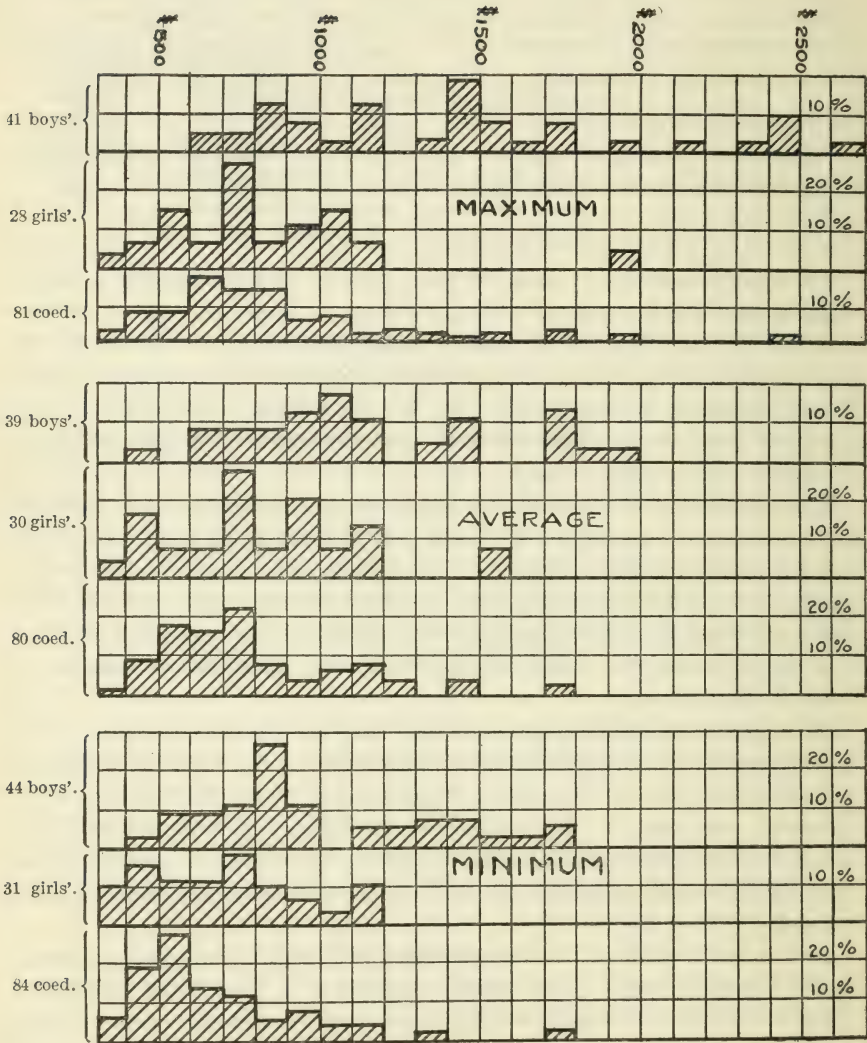


FIG. 3.—Percentage distribution of salaries of mathematics teachers.

In the coeducational schools the figures range from \$35 per month to \$2,500 per year. Besides the one reporting this maximum, only one school has a maximum as high as \$2,000. Ten have maximum salaries ranging from \$1,200 to \$1,800. Eighty coeducational schools gave an average salary. In more than half of these the sum varies from \$500 to \$800. In 20 of the 80 schools it lies between \$800 and \$1,200.

The average of the salaries reported as the salary of a single teacher or the average of the salaries of all mathematics teachers in a school is, for boys' schools between \$1,100 and \$1,200, for girls' schools between \$700 and \$800, and for coeducational schools practically the same as for girls' schools.

On the whole, the salaries reported from schools of the North Atlantic States are considerably higher than in other parts of the country, although the few schools representing the far West give figures closely corresponding to those in the North Atlantic States.

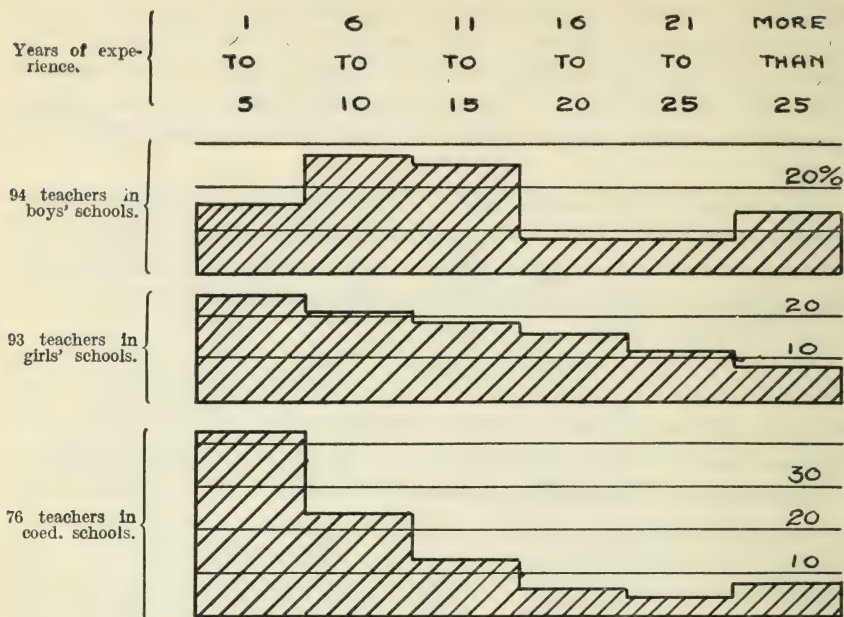
Academic and professional training of teachers.—The supplementary questionnaire called for data in regard to the training and professional experience of teachers of mathematics. The replies represent 146 schools with 282 teachers. As one would expect, the teachers referred to in the reports from boys' schools are practically all men and from the girls' schools women. There is a much larger proportion of male teachers in the coeducational schools reporting than in coeducational schools generally.

The following table gives a distribution of the teachers for whom data were reported according to total length of experience in teaching and also according to length of service as teachers of mathematics. (See fig. 4.)

Years of experience in teaching.	Distribution of teachers by years of experience in teaching.			Distribution of teachers by years of experience in teaching mathematics.		
	Boys' schools.	Girls' schools.	Coeducational schools.	Boys' schools.	Girls' schools.	Coeducational schools.
1 to 5 years.....	15	24	32	25	34	35
6 to 10 years.....	26	20	18	26	20	18
11 to 15 years.....	24	17	11	18	10	10
16 to 20 years.....	8	15	5	8	17	8
21 to 25 years.....	8	10	4	8	6	2
Over 25 years.....	13	7	6	13	3	4
Total.....	94	93	76	98	90	77
Average.....	14.0	12.6	9.7	12.8	10.5	9.1

It appears that 35 per cent of these teachers have taught mathematics not more than 5 years and nearly 60 per cent not more than 10 years. The average length of service is greatest in the boys' schools and least in the coeducational schools.

EXPERIENCE IN TEACHING.



EXPERIENCE AS TEACHERS OF MATHEMATICS.

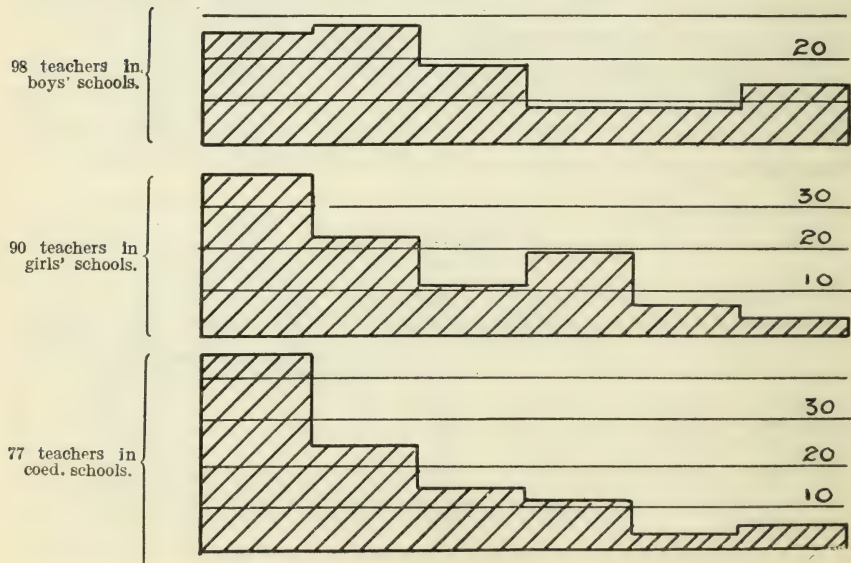


Fig. 4.—Length of teaching experience of mathematics teachers; percentage distribution.

The facts relating to the academic and professional education of the teachers reported are, in brief, as follows:

Academic education.	Boys' schools.	Girls' schools.	Coeducational schools.
Number of teachers reporting.....	101	92	79
Number having doctor's degree.....	3	0	2
Number having master's degree (no higher).....	22	12	21
Number having bachelor's degree (no higher).....	58	53	46
Total number holding degrees.....	83	65	69
Number having partial college education (not including summer school work).....	9	6	3
Number having full normal course.....	2	3	0
Number having partial normal course.....	3	5	2
Number having full high-school course.....	3	4	3
Number having partial high-school course.....	1	4	1
Number mentioning no academic training.....	3	5	1
Total number not holding degrees.....	18	27	10
Percentage not holding degrees.....	18	29	13

Eighty per cent of all the teachers for whom the data were given were holders of degrees. The proportion is not as high (about 70 per cent) for teachers in girls' schools as for those in schools for boys and for both sexes, and a smaller portion of degree holders teaching in the girls' schools have taken a second degree than is the case among teachers in the other institutions.

About half of the holders of degrees report academic or professional training in addition to that required for a degree, the proportion being highest in schools for girls. Of the teachers in girls' schools who have received no degree, nearly all have had some definite professional education or academic work of collegiate grade.

Seventeen of the male teachers have had training for other professions: Four for law, two theology, one medicine, one agriculture, and nine engineering.

Direction of the department of mathematics.—In a small majority of the schools replying to the principal questionnaire, the work in mathematics is directed by the principal, who, more often than not, teaches some of the classes in mathematics. In Roman Catholic schools the principal usually directs the work and does not often teach mathematics.

In the other schools one of the teachers of mathematics usually acts as director, but in the preparatory departments of colleges one of the college teachers frequently supervises the preparatory work. Usually, but not always, he teaches some of the classes in secondary mathematics.

In the boys' schools the directors are men in all the schools reporting; in the girls' schools one-sixth of the directors are men, while in the coeducational schools seven-eighths are men.

Size of classes.—About two-thirds of the schools replying to the principal questionnaire gave the numbers of pupils in recitation sections in mathematics. These represent a very wide variation, a few classes having 60 to 70 pupils each, while many have less than five. In general the size of the school determines the size of the classes, comparatively few schools (about one-fifth of the boys' schools and coeducational schools and a smaller proportion of the girls' schools) having more than one section of a given class.

In schools having parallel sections the variation corresponds closely to that for all the schools, excepting at the extremes of the scale. Few of these parallel sections have less than 10 or more than 30 pupils. A comparatively large proportion of the girls' schools have very small divisions, even when classes are divided. The largest schools (for boys and for both sexes), which have in some cases as many as eight parallel sections, organize recitation sections of about 25 pupils each.

The replies in which enrollments were clearly recorded included over 1,500 recitation sections, about 500 in boys' schools, 300 in girls' schools, and 700 in coeducational schools. (See fig. 5.) On the whole the size of classes is about the same in the boys' schools and coeducational schools (average between 16 and 17) and considerably smaller in the girls' schools (average 11). Nearly 30 per cent of the sections from girls' schools have from 1 to 5 pupils each, while only 12 per cent of the sections from other schools have as small an enrollment as this. About 80 per cent of the sections from girls' schools have not more than 15 pupils each. About half of the other sections fall within this limit. From 85 to 90 per cent of all the divisions have not more than 25 pupils each.

*Time allotment.*¹—Intelligible answers to the question in regard to the time allotment were given in about 80 per cent of the replies. The normal plan for mathematical courses is to have five recitations per week but four are not infrequently assigned, and some of the boys' boarding schools have six. In the North Atlantic States some schools have only three recitations per week.

The tendency is to reduce the number of periods in the later years of the course. In the last year, where elective courses are common, there is much variation and in many cases it is possible for a student's program to include seven or more periods in mathematical subjects. In scientific courses seven periods per week are sometimes required in the last year.

The length of the recitation period varies from 20 minutes to 75 minutes, but 40 or 45 minutes is the usual length.

¹ Data of principal questionnaire.

*Grading and promotion of pupils.*¹—In regard to the admission of pupils to the school, 41 schools use no examinations but admit pupils on trial, on credentials from other schools, or—as in nearly all cases—on both conditions. Thirty-one schools use an oral examination in connection with credentials or trial or both, 4 use a written examination as the sole basis for admission, and 59 use written examinations

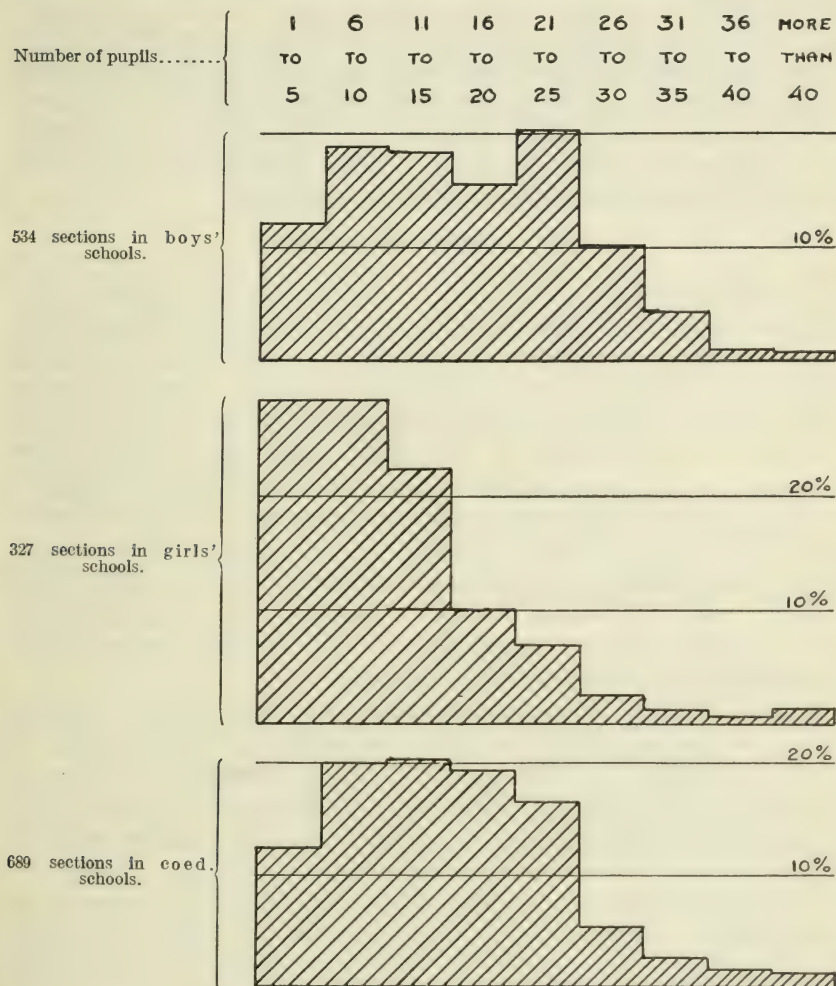


FIG. 5.—Sizes of mathematics classes; percentage distribution.

in connection with one or more of the other methods referred to. In 90 per cent of the schools some member of the mathematics department is consulted in regard to the grading of new pupils.

Promotion in mathematics is independent of the standing in other subjects in 80 per cent of the schools reporting (about 100). In a

¹ Data of the supplementary questionnaire.

few schools a pupil is not promoted in any subject unless he passes in all; in some cases promotion is based upon the pupil's average standing in all subjects; in others a pupil is obliged to repeat mathematics even though he has done well in it, if he fails in a certain proportion of his other work. Several say that standing in mathematics and English or mathematics and Latin determines promotion in all subjects.

No definite statements are made in regard to the bearing of these plans of promotion upon the effectiveness of the teaching in mathematical classes, but so far as this testimony goes, there would appear to be few instances in which teachers of mathematics are hampered by unsatisfactory grading of pupils. Some data in regard to examinations for promotion are given later in the report.

THE COURSE OF STUDY.

Determination of the content of the course of study.—In answer to the supplementary questionnaire about 100 schools gave information in regard to the control of the course of study. In 10 cases the content of the course is said to be determined by college entrance requirements, and in 5 cases by trustees, governing board, or some outside authority. In two-thirds of the other schools the principal takes some part in the determination of the course, usually consulting with teachers, head of department, faculty, or trustees. A head of department acts alone in 14 schools in dealing with the content of the course. In 9 schools teachers of mathematics are free to lay out their courses of study, and in 28 others they are consulted. The plan mentioned by the greatest number of schools (20) calls for joint action by the principal and the teachers of mathematics.

A large majority of the schools report that the director of mathematics is free to modify the course of study to suit the needs of particular classes, but the approval of the principal is frequently mentioned as a condition. College requirements are often referred to as a definite limitation upon modification of the course, and the details reported in answer to the principal questionnaire would seem to indicate that these requirements have a controlling influence in most schools. So far as one can judge from the meager comments on "flexibility of the course" the freedom of the teachers is usually limited to order of topics, proportion of time devoted to different topics, and methods of teaching. There is nothing in the replies to show that courses are shortened or changed in content to suit the characteristics of particular classes.

Teachers are commonly free to select their own textbooks, although the approval of the principal or head of department is often required. In 14 schools books are selected by the principal and in 17 by the head of department.

The course in general.—Eighty per cent of the returns from the principal questionnaire report the mathematical subjects in each year of the course. Most of the schools report no differentiation for students anticipating different vocations, but schools giving commercial courses commonly require commercial arithmetic—sometimes in place of geometry—for pupils of this department. In many schools separate sections are organized for college preparatory students, and in some cases, particularly in the girls' schools, such students are required to take more work in mathematics than others.

With very few exceptions all students are required to study elementary algebra and plane geometry. Solid geometry is given in about 80 per cent of the boys' schools, 40 per cent of the girls' schools, and 65 per cent of the coeducational schools. Plane trigonometry is given in about 75 per cent of the boys' schools, 35 per cent of the coeducational schools, and 18 per cent of the girls' schools. "Advanced" algebra is given in nearly half of the boys' schools, rarely in the others. Solid geometry, plane trigonometry, and advanced algebra are frequently elective subjects, except for students of the scientific course. They are seldom given in the girls' schools of the North Atlantic States. A very few schools give courses in spherical trigonometry, analytical geometry, and calculus.

Order of subjects.—The most general arrangement of subjects in the four years' course is that which places algebra in the first two years, plane geometry in the third, and solid geometry and plane trigonometry in the fourth. There are, however, many variations from this plan.

Arithmetic, either alone or combined with algebra, is given in the first year in about one-fourth of the boys' schools and coeducational schools. It is given less frequently in the girls' schools.

Plane geometry is frequently placed in the second year instead of algebra. In many of the boys' schools the time assigned to mathematics in the second and third years is divided between algebra and geometry, but this practice is much less common in the other schools.

Solid geometry is sometimes given in the third year, usually as a continuation of the course in plane geometry, which occupies the first part of the year. This plan is common among the coeducational schools, about one-fourth of which give no mathematics in the fourth year.

The final year of the course is characterized by much variation. Several schools for girls and for both sexes give courses in practical arithmetic. Some schools defer plane geometry until this year and others give a second course in elementary algebra or a combined course in algebra and plane geometry. About one-third of the girls' schools report courses for review of algebra and plane geometry, which are usually required for college preparatory students.

Schools which give solid geometry, trigonometry, and advanced algebra usually assign these subjects to the final year.

Content of courses in the various subjects.—The principal questionnaire called for a detailed description of the course of study by references to textbooks, with comments indicating departures from the order or scope of the books referred to. This part of the questionnaire brought the least satisfactory returns. In many cases no information was given, and in others it was obviously incomplete. About 40 per cent of the returns, representing about 160 schools, indicated the scope of the courses. As these conform closely to college-entrance requirements, perhaps the most satisfactory method of describing the content of the course will be to quote the definitions of the College Entrance Examination Board, and to indicate roughly any tendencies to depart from these definitions. They are as follows:

a. Elementary Algebra—Algebra to Quadratics and Quadratics and beyond.

(a. i. Algebra to Quadratics.)

The four fundamental operations for rational algebraic expressions.

Factoring, determination of highest common factor and lowest common multiple by factoring.

Fractions, including complex fractions, and ratio and proportion.

Linear equations, both numerical and literal, containing one or more unknown quantities.

Problems depending on linear equations.

Radicals, including the extraction of the square root of polynomials and of numbers.

Exponents, including the fractional and negative.

(a. ii. Quadratics and beyond.)

Quadratic equations, both numerical and literal.

Simple cases of equations with one or more unknown quantities that can be solved by the methods of linear or quadratic equations.

Problems depending on quadratic equations.

The binomial theorem for positive integral exponents.

The formulas for the n th term and the sum of the terms of arithmetical and geometric progressions, with applications.

It is assumed that pupils will be required throughout the course to solve numerous problems which involve putting questions into equations. Some of these problems should be chosen from mensuration, from physics, and from commercial life. The use of graphical methods and illustrations, particularly in connection with the solution of equations, is also expected.

b. Advanced algebra.

Permutations and combinations, limited to simple cases.

Complex numbers, with graphical representation of sums and differences.

Determinants, chiefly of the second, third, and fourth orders, including the use of minors and the solution of linear equations.

Numerical equations of higher degree, and so much of the theory of equations, with graphical methods, as is necessary for their treatment, including Descartes' rule of signs and Horner's method, but not Sturm's functions or multiple roots.

c. Plane geometry.

The usual theorems and constructions of good textbooks, including the general properties of plane rectilinear figures; the circle and the measurement of angles; similar polygons; areas; regular polygons, and the measurement of the circle.

The solution of numerous original exercises, including loci problems.

Applications to the mensuration of lines and plane surfaces.

d. Solid geometry.

The usual theorems and constructions of good textbooks, including the relations of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders, and cones; the sphere and the spherical triangle.

The solution of numerous original exercises, including loci problems.

Applications to the mensuration of surfaces and solids.

e. Trigonometry.

Definitions and relations of the six trigonometric functions as ratios; circular measurement of angles.

Proofs of principal formulas, in particular for the sine, cosine, and tangent of the sum and the difference of two angles, of the double angle and the half angle, the product expressions for the sum or the difference of two sines or of two cosines, etc.; the transformation of trigonometric expressions by means of these formulas.

Solution of trigonometric equations of a simple character.

Theory and use of logarithms (without the introduction of work involving infinite series).

The solution of right and oblique triangles and practical applications, including the solution of right spherical triangles.

f. Plane trigonometry.

The subject is the same as the preceding except that no topics from spherical trigonometry are included.

In algebra many of the schools reporting limit the work of the first year to the fundamental operations with integral and fractional expressions, factoring, and the solution of linear equations with one or more unknowns. Others cover all the topics included in the foregoing definition of "Algebra to Quadratics," and a few give still more advanced work. The complete course in algebra as reported by some schools is more comprehensive than the definitions, including some or all of the following topics: Inequalities, imaginaries, variation, harmonical progressions, infinite series, undetermined coefficients, logarithms, probability, continued fractions, summation of series, exponential and logarithmic series, theory of numbers.

In geometry and plane trigonometry the scope of the courses is more nearly uniform than in algebra. Nearly all the schools reporting follow the textbooks closely, almost the only change mentioned being the omission by many schools of theorems on maxima and minima of plane figures. In solid geometry one widely used textbook adds a chapter on conic sections to the topics included in the definition of the College Entrance Examination Board, but many schools omit this.

METHODS.

General classroom methods.—In the schools represented by the returns from the supplementary questionnaire a part of nearly every lesson is devoted to oral recitation of the assigned lesson, but this plan is used less frequently in algebra than in geometry. In many of the schools oral drill occupies a small part of each period, and in most of them blackboard work by pupils is called for regularly. A common practice is to have half the class at the board while the other half works at seats or recites the lesson of the day. In most schools classes are required occasionally to answer in writing questions on the assigned lesson. A new topic is usually developed in class before home work upon it is assigned.

*Preparation of lessons.*¹—The younger pupils and those whose work is deficient are in many schools required to prepare their lessons under the supervision of teachers. The older pupils in good standing generally study in their rooms, if in a boarding school, or at home, if day pupils. A few schools report a regular weekly period in which the teacher trains the pupils in methods of preparing a new lesson.

The lesson to be prepared out of class, in algebra, consists usually of problems taken from the textbook. In geometry the lesson commonly calls for a studying of theorems to be recited in class. Other types of lessons reported are: Study of definitions, rules, methods of solution, and general principles; writing of notes, outlines and summaries, demonstration of original theorems, solution of numerical problems based on geometrical relationships, problems in geometrical construction, practical problems, invention of problems to illustrate a principle, plotting of graphs, construction of models, and out-door measurements.

Special methods and devices.—The following specific methods and devices were listed in the principal questionnaire, and reporting officers were asked to cross out those not in use, to indicate the time during which each method had been used, and to state whether it were still in use. The number after each item indicates the percentage of replies in which the method was reported to be in use.

Use of squared paper.....	49
Preliminary course in observational geometry preceding formal demonstration.....	32
Laboratory method.....	27
Use of historical material.....	26
Heuristic method.....	24
Development of course in geometry without a textbook.....	20
Paper folding.....	19
Study of logic in connection with geometry.....	16
Mathematical recreations.....	10
Organization of a mathematics club among the pupils.....	4

¹ Based on returns from the supplementary questionnaire.

In nearly all cases methods once used were reported to be still in use, but a few schools after a trial have abandoned the teaching of geometry without a textbook, and a few others the use of a preliminary course in observational geometry.

Perhaps the most noteworthy feature of this record is the general use of squared paper, which has been introduced within five or six years by most of the schools which stated the period of use.

Source and variety of problems.—The most common practice is to use the problems in the pupil's textbook or to supplement these by dictated problems, but in many schools the pupils have at hand more than one collection of exercises. Historical problems, and those drawn from other school subjects and from current events, are said to be used in about half of the schools replying. Problems based on industrial appliances and processes and those involving out-of-door measurements are used in many of the boys' schools and coeducational schools.

Equipment.—Three-fourths of the returns to the principal questionnaire indicate, on lists of apparatus and tools, which of the articles are possessed by the school.

About 40 per cent of the schools replying reported mathematical reference libraries varying in size from two or three volumes to several hundred volumes. The median size is 50 volumes.

Three-fourths of the schools have geometrical models and drawing tools for use with the blackboard. A measuring tape is part of the general equipment of half of the girls' schools and two-thirds of the others. About one-third of the girls' schools and more than half of the other schools include a plumb line in their lists of mathematical apparatus. One-third of the schools for boys and for both sexes and a small proportion of the girls' schools have engineers' transits and nearly as many have sextants. A few schools report other surveying instruments which were not included in the printed list. About one-fourth of the schools have slide rules, coordinate blackboards, and spherical blackboards; a smaller proportion have portraits of mathematicians and a very few have lantern slides illustrating mathematical subjects. On the whole the boys' schools have more extensive general equipment than the others.

In practically all of the schools each pupil is supplied with a ruler and compasses. In a majority of the schools he has also triangles, protractor, dividers, and squared paper; and in many schools a ruling pen is added to the pupil's individual equipment.

With the exception of the possession of a mathematical library, which was indicated by recording the number of volumes, an item of equipment not crossed out stands as a possession of the school. This fact doubtless makes the foregoing proportions too high.

Time of emphasis upon logical relations.—In accordance with the suggestion of the central committee in its report outlining the plan of the investigation, a question was included in the principal questionnaire asking at what stage (grade) emphasis is shifted from manipulative skill to the understanding of logical relations. Only about 40 per cent of the returns gave answers to this question, the replies from the girls' schools being especially meager. The question seems to be too vague to make the reports of much value.

Every grade from the first year in the primary school to the beginning of the college course is mentioned as the time for emphasizing logical relations. Many lay stress on reasoning from the beginning of the course, and others say that the change of emphasis comes about "gradually," "at no definite time," or "varies with the class."

The grade mentioned most often as the point of transition in the reports of each class of schools (boys', girls', and coeducational) is the second year of the four-year high-school course, when pupils are about 15 years of age. The general tendency seems to be to make the change of emphasis earliest in the girls' schools and latest in the boys' schools.

EXAMINATIONS AND TESTS.¹

Examinations given by the school.—Formal written examinations are given by nearly all the schools, varying in frequency from twice a month to once a year. There are two well-marked tendencies, one toward short monthly examinations and the other and more general one toward longer examinations two or three times a year. Two examinations are commonly given in the girls' schools and three in the boys' schools and coeducational schools.

The examinations vary in length from 30 minutes to 240 minutes. In the girls' schools and coeducational schools monthly examinations commonly last about 45 minutes, and term or semiannual examinations 2 hours. In boys' schools there is greater variation in practice, but the tendency is toward longer examinations, 3 hours being nearly as common as 2 hours for term examinations.

In a few schools promotion is dependent solely upon the passing of these examinations, but the common practice in calculating the pupils' standing is to give examinations one-half or one-third of the total weight. The papers are in almost all cases set and marked by the teacher.

In addition to the formal examinations written tests are given in most schools, sometimes weekly, but more commonly once or twice a month. These tests occupy in most cases about 45 minutes.

Purpose of examinations given by the school.—The purposes most generally recognized for examinations given as a part of the school

¹ Data of supplementary questionnaire.

work are to serve as a spur to pupils and as an incentive to review and organization of subject matter. The latter purpose is considered by many to be the most important. Most of the teachers consider examinations of some value as tests of a pupil's ability and progress, but in both these respects many point out that such tests are often misleading. There is nothing in the replies to indicate that examinations are used to measure a pupil's progress with any degree of exactness. A majority of the teachers consider that examinations act as a spur to teachers and serve as a test, for their own benefit, of the efficiency of their work. Many, however, do not think highly of this purpose of examinations. About half the replies approve of examinations for the purpose of comparing the relative standing of different classes. The purpose securing the least support is that of testing the efficiency of the teacher for the enlightenment of school officers.

Ill effects of examinations given by the school.—In answer to the question, "What ill effects have you noticed of the examinations given in the school by teachers or school officers?" Forty-one schools replied "none" and 30 gave no answer, which in most instances is probably equivalent to the answer "none." The ill effects most frequently mentioned are nervous excitement (28 cases), "cramming" (15 cases), tendency to place a wrong interpretation upon the value of examinations, including working for marks (14 cases), discouragement of weak students (10 cases), and temptation to dishonesty (9 cases). Most of the reports referring to nervous strain came from girls' schools; only two were from boys' schools. In many instances the teachers reporting emphasize the fact that the ill effects are confined to a few individuals.

Modifications of school examinations are suggested in only a few of the replies. These include exemption from examinations for pupils of high standing, increase in number and decrease in length of examinations.

Admission of students to higher institutions.—Two methods are in common use for determining a student's fitness to enter college, namely, (1) examinations by the college or by the College Entrance Examination Board and (2) a certificate furnished by the school of the completion by the student of the requirements prescribed by the college. Among the 113 schools reporting on this matter, practice seems to be about equally divided between the two methods. In 22 schools all candidates take examinations, in 17 all enter on certificate, while in the others the two methods are combined in all proportions. In New England the examination method is the common one, and in the North Central States the certificate. In the Middle Atlantic States a majority of the schools send more than half their students to college "by examination," but many use the certificate freely.

Among the girls' schools there appear to be two distinct groups. In the larger group the certificate is used freely, in the smaller one it is never used.

The variation in use of the different methods is due in part to the demands of the colleges, since a few of the largest institutions admit students only by examination. It is evident, however, that many schools are not in favor of the certificate plan, and prefer to have their students take examinations.

Effect of college entrance examinations.—A large majority of the schools report that the course of study has been affected by college entrance examinations. The most general criticism is that the courses are overcrowded.

Only a few mention any effect on methods of teaching, but nearly all of these agree that much time is devoted to drill in preparation for the examinations which would otherwise be omitted. The papers of previous years are used for practice. One school required its students to spend alternate Saturday mornings after New Year in taking these practice examinations. A few say that the restrictions imposed upon the freedom of the teacher by the necessity of preparing for the examinations tends to make his work mechanical.

Most of those who refer to standards of work think that they are raised by the examinations. A few think that they are lowered. Others say that they furnish a definite standard.

Effect of the certificate plan.—A majority of the schools which send pupils to college "on certificate" report that no changes have been made in course of study, methods of teaching, or standards of work as a result of inspection of the school or scrutiny of the records of its graduates by college officers. Several, however, say that the work has been made more thorough in response to these checks. Some schools keep a record of the college work of their graduates who have been entered "on certificate," and several make a practice of certifying only pupils who attain a high standard.

One teacher says that the success in college work of the certified graduates of his school encouraged him to depart further from conventional methods and courses. Another says that the responsibility of a school for the college work of a graduate whom it has certified stimulates teachers to strive to give their pupils a real grasp of the subject rather than a temporary knowledge such as serves for passing an examination.

MATHEMATICS AND COEDUCATION.

As the practice in the private secondary schools of the United States is about equally divided between coeducation and separate education of the sexes, this field seems to offer a peculiarly favorable opportunity for studying the relation of coeducation to mathematical

education. The practice in the different types of schools has, therefore, been presented in the foregoing discussion in relation to most of the points considered.

To supplement the statistics bearing upon actual practice, it was felt that the opinions of the teachers as to the bearing of coeducation upon the effectiveness of mathematics teaching would be of value. Accordingly, the supplementary questionnaire for coeducational schools contained questions calling for such opinions. Thirty-six replies were received.

Nine of the teachers answering the questions had taught in coeducational schools for not more than 5 years; 13 from 6 to 10 years; and 13 over 10 years. Only 6 had taught separate classes of boys, and only 3 separate classes of girls, all of whom were included among the 6 who had taught boys alone. The fact that so few of the replies came from teachers who have had experience in teaching the sexes separately evidently diminishes the value of the testimony.

In all the schools represented by the replies coeducation had been in use from the establishment of the school; but one reported having separated the sexes for class instruction during recent years. Two schools besides the one just mentioned reported that there is some prospect of separation of the sexes in class work, in the interests of a better adaptation of rate of work, character of subject matter, and methods, to peculiar characteristics of the sexes. None of the other teachers see any prospect of the modification of the present plan.

Teachers were asked to compare the sexes with regard to their success in passing the requirements in the various mathematical subjects. In arithmetic 20 report no difference, 7 state that boys are more successful, 4 that girls are more successful; in algebra 21 find no difference, 6 consider boys more successful, 5 consider girls more successful; in geometry 13 report that the sexes have equal success, and 19 consider that boys excel; in trigonometry, 9 report no difference, and 14 consider that boys are more successful. Several said that, while boys are as a rule superior as mathematical students to girls, there are frequently brilliant students in mathematics among the girls.

In regard to the relative tendency of boys and girls to choose elective courses in mathematics, the answers indicate that boys are much more inclined to elect such courses than girls are.

In accuracy of intuition in regard to mathematical relations, 6 of the teachers report no difference in the sexes, 1 considers girls slightly superior, and 19 boys superior.

In skill in formal processes, 11 find no difference, 8 find boys superior, 10, girls superior.

In grasp of logical sequence, 6 report no difference, and 25 boys superior.

In ability to solve "original theorems," 28 say that boys are superior, and 3 report no difference.

In answer to the question, "Do you think that the subject matter of high-school courses in mathematics should be the same for both sexes?" 14 replied "Yes," 9 replied "No," and 7 replied "Yes" with qualifications. The differences in subject matter for boys and girls regarded as desirable by some teachers are: (1) Requirements in algebra and geometry should be less for girls than for boys. (2) Solid geometry and trigonometry should be omitted or made optional for girls. (3) The applications should be such as appeal to the interest of both sexes.

Only one difference in methods of teaching the sexes was suggested and that was mentioned by only one teacher; namely, that mathematics be developed empirically rather than logically in the instruction of girls. It is interesting to note in this connection that one teacher, arguing from the same characteristics as shown by the sexes, would give the girls special training in logical reasoning.

To sum up, most of the teachers who gave testimony agree that there is a difference in the mental traits of boys and girls and in their ability to do different kinds of mathematical work; but a decided majority do not consider that these differences are sufficiently great to warrant separate class instruction. About a fourth of these teachers would provide for sex differences by a slightly different treatment of pupils in the same class and by making part of the work elective; another fourth feel that the differences are too great to permit the most effective work unless separate classes are provided.

AIM OF INSTRUCTION IN MATHEMATICS.

With a view to gaining some insight into the attitude of teachers of mathematics toward their work and to learning the extent to which they attempt to analyze their problem, the supplementary questionnaire included a list of questions on the aims of instruction in mathematics and the means employed to attain these aims. The list included questions on the general aim of mathematics teaching, the aims especially served by the different mathematical subjects, the inclusion of individual topics in the curriculum for specific purposes, the relation of course of study in mathematics to vocational training, and the value of mathematics for mental discipline.

Aim of instruction in mathematics in general.—In presenting the question on the general aim, nine statements were given of which teachers were asked to cross out those not recognized, a method which gives no means of discriminating between controlling aims and those having only a slight influence. This defect is remedied to some extent by the questions on the relation of particular subjects and topics to the various aims.

Of the 136 replies, all recognize *mental discipline* as one of the aims of mathematics teaching, and all but three work for the *development of an accurate conception of space and form*. Nearly all approve of *preparation for more advanced work in mathematics, preparation for studying other subjects, the teaching of mathematical truths for their own sake, and the cultivation of an appreciation of the importance of mathematical knowledge in modern life*. Only eleven schools are able to ignore *preparation* either for examination or for requirements imposed by outside authorities.

The *preparation for vocations* is the aim least generally recognized. Ninety per cent of the boys' schools recognize this aim, but only a little more than half of the girls' schools regard it.

Predominant aims in teaching special subjects.—About one-fifth of those reporting apparently find it difficult to select the aims chiefly served by the different mathematical subjects, for they pass the question by. The replies represent a very wide variation of opinion, every one of the aims being mentioned by several as important in connection with each of the subjects. Very few consider any one aim as sufficiently influential in teaching any subject to warrant its standing alone as the predominant aim.

A rather marked difference exists in point of view of the teachers in girls' schools on the one hand and those in boys' schools and coeducational schools on the other. Among the girls' schools, mental discipline is most generally regarded as a predominant aim. In the other schools, vocational training and preparation for advanced work in mathematics are mentioned most frequently in connection with arithmetic and trigonometry, and preparation for study of advanced mathematics and other subjects in connection with algebra. In geometry, mental discipline takes first place, and the development of accurate conceptions of space and form stands second in the reports from all three types of schools.

Topics included in the course to serve specific aims.—About 30 per cent of the reports make no attempt to answer the question on the relation of aims to particular topics of the course. The others represent the greatest variety of opinion. Many teachers apparently have no specific purpose in mind in teaching any topic and there is little agreement as to the topics which best serve a given purpose. Every one of the nine aims listed in the paragraph on aims in general is given by several teachers as the chief purpose for including *graphs* in the course. One can hardly avoid the conviction that custom as expressed in college-entrance requirements and in textbooks is the chief factor in determining what topics shall be taught.

Proposed requirements in mathematics for various classes of students.—In the opinion of the majority of teachers there is need of very little differentiation of mathematical courses in accordance with vocational

intentions or plans for higher education. Arithmetic, algebra, and plane geometry would be required for all classes of students, except the boys preparing for technical schools, who, in the opinion of the majority, have had enough arithmetic in the elementary schools. They should, however, have solid geometry and trigonometry in addition to the other subjects. While this represents the consensus of opinion several modifications are strongly supported. For college preparatory students of both sexes and for boys preparing for law and medical schools nearly half the teachers would omit arithmetic as a requirement in the secondary school. More than a fourth of the replies call for solid geometry as a requirement for boys preparing for college, and advanced algebra for boys intending to enter technical schools. For boys anticipating a business career and for girls whether preparing for technical schools, for commercial positions, or for domestic responsibilities a strong minority would require neither algebra nor geometry. In the case of the girls this view is supported by from 20 per cent to 40 per cent of the replies. A few would make the geometry concrete for girls not preparing for college and many would treat the subjects differently for commercial students (especially girls). The modifications suggested relate chiefly to shortening the courses, omission of theoretical discussions, and emphasis upon practical applications.

Analytic geometry and elementary treatment of the calculus are proposed by only four or five teachers as part of a course for boys preparing for technical schools.

Following is a summary of the replies in tabular form:

Proposed requirements in mathematics for various classes of pupils.

Proposed requirements.	Number of teachers recommending certain studies for—							
	Boys for—				Girls for—			
	College.	Technical schools.	Business	Professional schools.	College.	Technical schools.	Commercial schools.	Home duties.
Arithmetic.....	40	30	63	42	52	69	82	77
Elementary algebra...	80	80	69	73	98	64	65	74
Advanced algebra.....	6	24	2	3	5	3	1	1
Concrete geometry.....						9	5	7
Plane geometry.....	80	80	61	71	98	59	53	65
Solid geometry.....	21	67	9	15	10	3	2	2
Plane trigonometry.....	11	60	6	12	8	2		1
Analytical geometry.....		4						
Elements of calculus.....		5						
Total number of replies.....	80	80	77	75	98	85	88	92

Mental discipline.—It has already been said that all the teachers reporting recognize mental discipline as one of the aims of mathematics teaching. As psychologists are claiming that too much

reliance has been placed upon the supposed value of study of a single subject for general improvement of mental processes, the opinions of teachers of mathematics upon this point seem pertinent to a discussion of aims.

To the request "If you regard mental discipline as an important aim, explain as fully as possible what you mean by mental discipline," nearly nine-tenths of the teachers give some reply, but very few attempt to analyze their conceptions. Mental discipline is, in most cases, described in vague, general terms, loosely applied, representing all sorts of mental and even moral qualities which are believed to result from a discipline of the mind. Nearly all have a firm conviction that general abilities are gained through exercise of the mind upon a particular subject, especially mathematics.

A composite of the replies shows that mental discipline is considered to be that which produces an improvement in intuition, judgment, memory, imagination, intelligence, reason, mental powers, reasoning powers; or an improvement in ability or power of mental concentration, initiative, sustained effort, analysis, generalization; or an improvement in ability to think rapidly, clearly, independently, logically; to recognize the essential elements in a problem, to note resemblances and relationships, to grasp and apply principles, to understand cause and effect. One of the most generally approved results of mental discipline is the ability to express thoughts clearly, concisely, and accurately. In a few cases mental discipline is described as the formation of habits; habits of mental concentration, of industry, of accuracy in thought and expression.

Following are a few examples of more definite analyses of the authors' conceptions of mental discipline:

Mental discipline is that process of mind which (1) recognizes there is a problem. (2) Wills that the problem be solved. (3) Perseveres until the desired goal is obtained.

Results of mental discipline are—

ability to observe well, to make correct records, written or in memory, of things observed, to sift data or evidence, to draw correct inferences, to state these inferences in clear language.

In only a few cases, such as the two following, is the influence of modern views of formal discipline apparent:

The modern psychologists have made this a difficult thing to do (explain meaning of mental discipline), but the habits of making exact statements, of finishing a piece of work in hand, of seeking the proof for each statement, not only ought to be valuable but I am convinced are valuable.

Mental discipline through mathematics for mathematical work consists in the acquirement of mathematical facts and ideas, processes, methods of solution, and standards of accomplishment. Mental discipline through mathematics for other kinds of work consists, I think, in development or strengthening of certain ideals or standards,

such as logical perfection, mastery of difficulties, etc. General power is not necessarily gained by the study of mathematics, but the student may be so impressed by the logical perfection of mathematical reasoning as to consciously test his thinking on other subjects by similar standards, and the sense of mastery experienced in mathematical victories may give confidence in attacking other difficulties.

About half of the teachers consider mathematics superior for mental discipline to all other subjects. A considerable number consider it superior for certain kinds of discipline, usually for improvement in logical reasoning or in accuracy. A few qualify their approval, saying that mathematics is superior to some subjects or for some minds. About 10 per cent of the teachers do not regard it as superior to other subjects and one says in answer to the question, "Decidedly no."

The nature of the superiority is usually stated in terms of the desirable qualities of mind which are said to be produced more readily through mathematics than through other subjects. One says it "requires thought." The superior quality of mathematics most frequently referred to are its definiteness and the absolute trustworthiness of its principles. The simplicity of its data and the ease of checking results make this the best medium for training the student in logical reasoning. On the other hand, it is said to call for greater mental effort, and therefore to result in greater mental power.

DISTINCTIVE FEATURES IN A FEW INDIVIDUAL SCHOOLS.

The following statements are added to the report, as originally prepared, in response to the feeling that the omission of all reference to experiments and attempts to improve prevailing practice would be misleading as a statement of the situation in the private secondary schools and also neglectful of the opportunity of acquainting teachers with such movements. The omission of this phase of the subject in the original draft was due to the impossibility of making a comprehensive statement in regard to it, and in employing this makeshift the committee is anxious that its relation to the rest of the report be clearly understood. We have no means of knowing how generally the ideas expressed in these six statements are affecting courses in the schools of the country, but it is certain that the two ideas which are here so prominent—unification of the various elements of the course and application of mathematical principles in daily life—are receiving much attention. We do not mean to imply that these are the most important movements now going on, and we are particularly desirous that it be understood that these schools have not been singled out as the best representatives of progressive teaching. In the absence of material for an adequate statement of movements for improvement, these statements are offered merely in proof of the fact that such movements are in existence and in the hope that the plans described may be of service to other teachers.

**PRINCIPLES UNDERLYING THE COURSE IN MATHEMATICS AS STUDIED
IN THE DETROIT HOME AND DAY SCHOOL, DETROIT, MICH.**

[This part of the report was prepared by S. A. Courtis, of the Detroit Home and Day School.]

The Detroit Home and Day School is a private school for girls. The activities of the school extend from the kindergarten through college preparatory work, and as the period of secondary education has been lengthened to 5 years, the courses provide for 15 years of continuous school life. About half of the 362 pupils enrolled during the present year (1911) are in the five grades of the academic department. The number of teachers and officers is 42. While nominally a commercial enterprise, practically the school is the life work of a single group of persons, the expression of a consistent set of educational ideals.

The school is educationally independent. While in all its college preparatory work its courses and standards are determined almost wholly by college-entrance requirements, it has, nevertheless, a sufficient body of pupils not going to college to warrant the close study of its own problems and the modification of its courses and methods to meet the needs and demands of the community. The school must be regarded, therefore, as an educational unity, complete in itself.

The organization of the school is along departmental lines, the departments being English, history, language, science and mathematics, and physical training. Heads of departments are free to work out the general aims of the school in ways best suited to the subject and conditions of the department. Unity is secured through unity of aim rather than through rigid adherence to a fixed system.

The vital characteristics of the school are three: Continuity, coordination, and correlation; continuity, because the courses in each department, from lowest to highest, form an unbroken series under one control; coordination, because in the same way all departmental work and all the life of the school from the lowest to the highest is under one control; and correlation, because from the viewpoint of those in control education is regarded as a whole, not as many separate wholes.

Taking up now the consideration of the mathematics course, the first point to be noted is the departmental unity made possible by the general organization of the school. So completely are the courses in mathematics the expression of a single aim that it will be impossible to consider the high-school work apart from the general plan. There is no break or change in passing from the earlier to later grades, from arithmetic to algebra and geometry. So completely are the subjects merged that the work of the high-school years is better described as a three-year course in mathematics than as specifically either algebra or geometry for any one year. Further, the direct preparation for the high-school subjects, geometry, for instance,

runs back to the earliest work. An increasing amount of geometric material is used in every grade, and the study of formal, demonstrative geometry is but the logical outgrowth of the preceding work. In the same way graphic work in algebra, or the use of the literal notation, is but the final culmination of an extended series of exercises through many previous grades. On the other hand, direct provision is made for review and drill upon certain topics of arithmetic in the high-school work. Further, in selection of subject matter, choice of methods, shift of emphasis, and remedying of defects, the point of view is that of the course as a whole rather than that of any single grade or division of subject matter.

A second point to be noted, also a direct result of the general principles of the school, is the correlation of the work in mathematics with the work in other departments. The merging of the departments of science and mathematics into one has resulted in the introduction of much laboratory work and science material into the work at all points, particularly into the intermediate grades in arithmetic. The laboratories of the school are in use nearly as much by the classes in arithmetic and algebra as by those in science. Material for problems is also drawn from other school subjects, geography, history, etc., from the activities of the school, and from daily life. A graded course in actual business and banking is a feature of the intermediate arithmetic work. In every way the effort is made to have the child realize the meaning of the work and its bearing on his daily life.

Pedagogically, the work of the department is based upon the condition that there are three steps in the natural growth of intellectual powers: The acquisition of basic, sensory experience; the development of control through use; and, finally, the formulation of the abstract principles involved. The attempt is made to have the children meet each new topic first in a concrete setting, as a problem for which no method of solution is known. The class work and laboratory then develop the method of attack and solution, and finally the knowledge and skill attained are tested in concrete problems out of which new topics arise.

In addition to conforming to the natural steps of intellectual growth, there is also the problem of adjustment of the character of the work to the development of the growing child. The courses of the school provide adequate training at every stage of growth. Not only is each topic met in at least three successive grades (the first year, incidentally; the second year, as the important topic of the year; the third year, for analysis and formulation, for learning of rules and for drill in the abstract principles involved), but the course covers the same ground three times, from different viewpoints, and passes by easy, connecting steps from the observational, concrete work of the kindergarten to the formal and abstract demonstrations of algebra and geometry.

From the foregoing it will be seen that the emphasis is placed upon the reasoning rather than upon the mechanical side of mathematics. Mention has already been made of the use of laboratory exercises, but this phase of the work needs special emphasis, for out of it all mathematical work proceeds and to it all knowledge and skill returns. Every effort is made to insure the intelligent use of mathematics as a tool. Opportunities are thus provided for the child to weigh values and learn through his own mistakes. For it is believed that understanding knowledge comes by use and not by instruction; that the child must have a chance to learn through his own struggles toward success.

On the other hand it is recognized that the growth of the child in accuracy and knowledge is of equal importance with his growth in understanding. Constant review of the old in the new is provided and there is systematic effort to let no part of the old be lost through disuse. Adequate and rigid drill, but drill in its proper place, after mastery through use, insure a high final efficiency. The extensive laboratory work and the provision for drill are both distinctive features of the course.

One further topic will be discussed, the aim of the mathematics courses, particularly in high-school years. The work of the department is organized around the belief that courses in algebra and geometry have a place and a function that can be filled by no other subject, i. e., to make plain the essential nature of the thinking processes itself. The value of mathematics for this purpose is unique because it alone can provide mental environment completely under control and completely devoid of emotional content. In such an environment only can an individual clearly see the relations between the various mental steps or acts which make up thinking. There is no question of transfer here. The child that learns to think in mathematics does not necessarily learn to think in other subjects, but the child that learns how he thinks in mathematics and that is taught to think in other subjects soon learns that all thinking is conducted on the same general plan. The courses in mathematics are planned to bring to consciousness the general features of all inductive and deductive thinking that out of any and all the mental activities of the individual there may issue the sooner that general method of behavior in the presence of a real problem that is characterized as "general ability." To this end the exercises of the school lay more emphasis than usual upon initiative and executive ability, upon original discovery and analytical thinking, upon recognition and formulation of relations as well as upon the deductive application of proved or accepted principles. As a result the mathematics courses have a vitality and a functional relationship to the rest of school work which was not possible under the older system.

Other features of the school are worthy of discussion, particularly the attempt of the school to study itself and to standardize its work through comparative tests given year after year under uniform conditions. The features mentioned, however—unity, correlation, and the principles back of the courses and methods—are those which distinguish the school from others of its kind and which have produced whatever of merit there may be in the activities of the mathematics department.

UNIFICATION OF ELEMENTARY MATHEMATICS.

[This part of the report was prepared by John S. French, principal of the Morris Heights School, Providence, R. I., and relates to certain experimental work in that school.]

The Morris Heights School, a boarding school for boys, is, primarily, a preparatory school for institutions of higher learning, its course extending over a period of 12 years, beginning with the first year of formal school work and concluding with the preparation for collegiate or technical training; pupils may thus retain membership in the school for a long period of time and benefit from the advantages of a continuous and progressive course of study. Hence, with particular attention paid to the mental condition of the pupil as a result of growth and with the opportunity of eliminating irrelevant material the work is so designed as to lead ultimately to preparation for higher instruction.

The general idea underlying the teaching of mathematics is the development of the scientific aspect. This does not lose sight of the fact that the mathematics of the elementary and secondary schools is limited to the technique of the subject, nor does it pretend to include the notion of a purely scientific development which involves a mastery of hypotheses far from the reach of younger minds. It does include in its scope the development of a working knowledge of the fundamental concepts where an appreciation of the relation between the different branches is emphasized for the purpose of unifying the work.

The time for the introduction of any topic into the curriculum is based on the principle that any topic entering into the sphere of a pupil's intellect should be taught him at once, in order to fix in his mind correct ideas about it.

To this end science is begun in this school in the fifth year (corresponding to the fifth grade), in which the pupils are taken into the laboratory and are shown by experiment and observation a large and, to be sure, unrelated group of facts in the realm of natural phenomena. In connection with this study there is gradually worked in, as a tool for getting results, the elementary concepts of form and their relation to number. Thus is laid gradually and un-

knowingly to the pupil the foundations of science, tending to a unification of subject matter later on.

To illustrate this work it is necessary to cite a single example only—the different methods of heating and ventilating buildings are studied, the pupils inspecting them under supervision. As an instance, they are required to draw a diagram of a heating system, to show the indirect method of heating by steam, and particularly to show its efficiency in ventilation; in addition to this certain dimensions are given, and from these and from statistics on coal consumption they are required to figure roughly the amount of coal necessary for heating the building. This work is continued in the sixth, seventh, and eighth years where the geometry is wholly inventional and the symbolic forms of algebra are used as a means for solving problems. The pupils continue the work in graphics by plotting barometric and thermometric readings, thus getting the first real taste of a continuous variation.

Algebra and geometry are taught simultaneously in the third form (first high-school year). The transition from inductive to deductive geometry is in no way abrupt; but the notion of one dimensional and two dimensional figures is carefully explained and with it the notion of equations of one and two unknown quantities, thus making the analogous relation between the two evident. The practical aspect of the two subjects is emphasized and their correlation with physics is continued.

In the study of formal deductive geometry the tendency is to introduce the principle of continuity as often as possible and thus avoid the difficulties to be encountered later on, resulting from the archaic methods of treating isolated topics; it also tends to make the work conform to the general results obtained in algebraic processes. This involves, among others, a consideration of magnitudes and directions in the study of metrical properties and also the geometric interpretation of real and imaginary, equal and unequal numbers, and is shown in the study of propositions involving secants and tangents, parallels, perpendiculars, similar figures, etc.

In the treatment of originals particular care is paid to the gaining of correct notions of analytic and synthetic methods of proof, and the equivalency of equations in transformations is very carefully treated.

In the more advanced courses the fundamental notions of the representation of a condition algebraically by means of the equation and geometrically by means of the locus, and the expression of one in terms of the other, are taken up where the representation of the straight line and circle in terms of algebra by its required number of

parameters is touched upon. Thus is brought in, in their true perspective, the ideas of functional dependence and functional variation.

The ideas of maxima and minima are studied in the graphical representation of functions, and the algebraic definition of a derived function is here made use of. In this work the pupil is taught how to express the conditions of his problem in algebraic forms and from this to plot the curve of the function whence the maxima and the minima points must correspond to the values obtained from equating the first derived function to zero and solving.

The trigonometric functions are brought into the geometry and their use in the generalized Pythagorean theorem is a tendency toward generalization; also, the idea of the vector quantity is frequently touched upon, so that when the pupil comes to the study of velocities and forces the expression, graphically, of resultants in terms of components presents no grave difficulties.

The notion of a limit is treated, not with strict mathematical rigor, but with the idea of creating a working knowledge of it gained inductively through concrete examples; it makes clear the similarity of incommensurables and irrationals by means of a graph where segments of the line have their distances measured in such a way as to give a clear representation of the limits in both cases.

In the constant use of symbolic forms such symbols are chosen as are applicable to the work at hand and in accord with usages higher up.

These somewhat disconnected statements concerning the work done in elementary mathematics are offered to show that the general tendency of the work is toward unification, having as an ultimate end the easy assimilation of the more difficult and severely rigorous methods employed in the teaching higher up. It is my opinion, based on experience, that the teaching of mathematics as an organic unity in which the various branches stand in the closest relation of interdependence is the only rational method of presentation, and, further, I am convinced that irrespective of the future work of the pupil he can be carried on with equal efficiency by this method of breaking down barriers and treating the different branches simply as multiform ways of expressing concepts which are closely allied as different modes of combining these concepts and as different representations by means of distinctly differing symbols, and these because the same laws of exact reasoning fundamentally govern all the branches.

This scheme of presentation is of value not only in adding to the efficiency of the pupil, but in making possible the covering of a wider area, even to including in his preparatory course a major portion of the work of the freshman year in college and this with an aggregate appropriation of 20 periods for the four-year course of the preparatory school.

COURSE OF STUDY—" MIXED MATHEMATICS."

[This part of the report was prepared by Prof. George W. Myers, of the University of Chicago, and relates to certain experimental work in the University High School, Chicago, Ill.]

The School of Education of the University of Chicago consists of four distinct parts, the graduate school of education, the college of education, the university high school, and the university elementary school. In this complex of departments the university high school, a coeducational institution of 600 pupils, undertakes to play a three-fold rôle. It seeks to carry forward the best type of general secondary education possible to its favorable situation between a carefully planned and executed elementary school and a strong and sympathetic university, supervised by a collegiate faculty of education and stimulated and aided academically in each of its departments of study by a strong cognate university department. It functions as a laboratory for students of the department of education for both observation and practice teaching in preparation for actual teaching in secondary schools and academies. It also undertakes to furnish a high order of preparatory training for colleges and universities. It has also strong departments of manual training and of applied arts.

Pursuant to this threefold office the department of mathematics of the school of education a few years ago undertook the double duty of endeavoring to work out in the classes into teachable form a body of mathematical subject matter of high educational quality that should jeopardize neither the interests of mathematical training nor of university entrance and at the same time to make the classrooms function as exhibit and laboratory rooms for teachers in training. After considerable preliminary experimenting it was determined to undertake to organize a body of mixed mathematics around a central line of algebraic notions for first-year students and to make geometrical ideas the controlling theme for second-year students. As to whether the plan of unified or mixed mathematics is to be carried through the third and fourth years or the plan of topical treatment is to be reverted to was left to be determined on the basis of experience with the classes of the first and second years. The first two years of the course have been worked out and the material is published in the texts entitled *First-Year Mathematics* and *Second-Year Mathematics* by the University (of Chicago) Press. Experience is now being sifted, analyzed, and studied, and it is believed the last two years of the course will soon be completed, though the precise nature of this part of the course can not yet be stated. With the part of the course already completed experience is highly encouraging.

Each teacher of the high school has participated both in the authorship and in the trying out of the material. On the whole the most encouraging feature of the experiment is the improvement that it has wrought in the teaching. The spirit of unity it has begotten

in the corps of instruction through cooperation on a common problem can be fully appreciated only by schoolmen who have seen the waste due to lack of cooperation.

With the cooperation of the high-school principal it has been possible to give each teacher at least one first-year class, one second-year class, and one or more third or fourth year classes. This vertical division of the teacher's duties brings him into close touch with all parts of the experiment and with every grade of maturity in the high school. This enhances interest by reducing the mere routine of both teaching and learning.

A fourth-year review course, consisting of one hour per week, is now required of all high-school students who are intending to obtain a diploma with certification to college. This course reexamines and renews the hold on the work covered during the first two years and gives to this work something of a scientific classification and treatment. The purely formal aspects of the work of algebra and geometry are given strong emphasis in this review. The work of the first two years together with this fourth-year review course constitute the required work of the school.

In the third year parallel courses are given in plane trigonometry and third-year algebra throughout the year, two hours per week being given to one subject and three to the other during the first semester, the time ratio being reversed the second semester. At present solid geometry and college algebra are given as separate subjects in the fourth year to those who elect them.

The method of procedure of teaching combines the laboratory, heuristic, expository, and recitation methods. New developments are worked out with the classes, sometimes heuristically, sometimes by the laboratory plan, and now and then by the recitation, quiz, and lecture plan. Home assignments are such as to call for further developments of fairly fully developed theory or examples to illustrate and emphasize theory. The first two years do not aim so much at thoroughness as at gaining a first hold on the coarser outlines of algebra and geometry. The later work places more emphasis on thoroughness and accuracy, though it does not, as is too often the case, lay great stress on mere "labial" precision.

The topics in order that are covered the first year are:

- I. General uses of the equation based on the notion of balance of values.
- II. Uses of the equation with perimeters and areas; related geometry.
- III. The equation applied to angles; related geometry and arithmetic.
- IV. Positive and negative numbers; related arithmetic and algebra.
- V. Beam problems in one and two unknowns; related mechanics.
- VI. Problems on proportion and similarity; related geometry.
- VII. Problems on parallel lines; geometric constructions.

- VIII. Fundamental operations applied to integral algebraic expressions.
- IX. Practice in algebraic language; general arithmetic.
- X. The simple equation in one unknown.
- XI. Linear equations in two or more unknowns; graphic solutions.
- XII. Fractions.
- XIII. Factoring; quadratics; radicals.
- XIV. Polygons; congruent triangles; radicals.

In the second year the topics covered are:

- I. Congruency of rectilinear figures and circles, with related algebra.
- II. Ratio, proportion, and similar triangles; related algebra and arithmetic.
- III. Measurement of angles by arcs of circles; related algebra; use and reduction of radicals.
- IV. Similarity and proportionality in circles; quadratic equations; solution by formula.
- V. Inequalities in triangles and circles; algebraic inequalities, indeterminate equations, discussion of roots; simultaneous quadratics.
- VI. Areas of polygons; use of algebraic formulas and expressions.
- VII. Regular polygons in and about a circle; use of formulas and equations.
- VIII. Problems and exercises in graphic and geometric algebra; radical equations.

We have as yet no statistical measures of the precise increase of output of this *modus operandi* with high-school students, but there are some improvements that are none the less real because they have not been reduced to figures. A few of them, confessedly of a qualitative nature, I think are worthy of mention in this report:

1. An increase in mathematical interest, earnestness, and spirit among early pupils.
 2. A genuine belief attained earlier than formerly among pupils as to the real worth of mathematical study.
 3. An improvement in independence and solidity of mathematical thinking among pupils of the first and second years.
 4. There is less of the disposition manifested now than formerly by pupils to learn a mathematical study mainly to pass an examination.
 5. Pupils try more persistently to check and guarantee algebraic results by some sort of geometrical means than was formerly the case.
 6. Pupils ask more frequently than formerly in friendly interest what advanced subjects are like, and manifest a desire to take more rather than less mathematics.
 7. Pupils acquire more of the all-round benefits of mathematical education. They are better balanced mathematically than formerly.
- Most teachers will agree that such results as these indicate a distinctly tonic influence upon the mathematical thinking of boys and girls.

THE PLANE GEOMETRY COURSE IN THE POLYTECHNIC PREPARATORY SCHOOL, OF BROOKLYN, N. Y.

[This part of the report was prepared by Eugene R. Smith, of the Polytechnic Preparatory School, of Brooklyn, N. Y.]

The Polytechnic Preparatory School is a day school having a secondary department of 350 boys. As the pupils enter from various private and public schools, the problem of the school is not simplified by uniform preparation. Its classes are small, the average size of the mathematics classes for the year 1909-10 being 18. The departments are highly centralized, the head of each department having both the authority and the responsibility for his department, and being subject only to the headmaster's general supervision of the school. The department of mathematics is composed of five men, none of whom teaches any other subject.

Elementary and intermediate algebra and plane geometry are required subjects, and are allowed five 43-minute periods per week for the first three years of the course. The first year is given up to elementary algebra, but the other two years have a combination course of algebra and geometry, about three-fifths of the time being given to geometry. The object of this simultaneous arrangement of courses is twofold: Increased interrelation of the subjects, and economy of time through continuous treatment of each subject from the time of its introduction until its completion.

In geometry, the use of a textbook containing the proofs of the propositions has been abandoned, and the classes are supplied with a text containing definitions, statements of propositions, discussions of method, including summaries and other helps to correct attack, and exercises.

It is believed that the chief aim in the teaching of geometry is the development of the power of logical thinking, and that this power, like any other, improves with practice. The intention of the course is, then, to discourage rote memorization of proofs and to encourage independent thinking. The propositions are all treated as "originals," or subjects for investigation, and sometimes statements of relationships are deferred until the facts needed to establish them have been discovered. Class development of propositions and exercises is by the "question and answer" method, the teacher asking questions suited to the ability of different pupils, and aimed to lead to a correct method of attack. Any ordinarily intelligent pupil who knows the preceding part of geometry as this requires him to know it, can do a good share of his own thinking, and while he must have guidance from the teacher, he does not need to be told things outright.

Besides class development of new propositions, there is much oral discussion and cross-examination on the relations of theorems,

their uses, methods of attack for various kinds of exercises, and other related topics. Propositions and exercises are assigned to be worked out at home or in study hour, and a good deal of written work is assigned; this written work comprises careful drafts of propositions and proofs, more or less condensed, of many exercises. It will be seen that this is a combination of the heuristic method and the genetic mode; it has, however, become customary to speak of it as the "syllabus method."

I have said that the pupils must know the preceding part of geometry. In no other way, I believe, does a pupil come to know so thoroughly just what he has had and for what he can use his knowledge as the subject is developed, the theorems are grouped, the use of each and its relation to those that precede and those that follow it are discussed, and an attempt is made to have the propositions classified in the mind of each pupil according to their uses. With this equipment a pupil who wishes to prove a proportion, to demonstrate a length relation, or to discover any geometrical truth, is able to decide promptly which group of theorems contains the one needed for his purpose.

For example, it is required to prove that if a perpendicular is dropped from one end of a chord to the line tangent to the circle at its other end, the chord is the mean proportional between the diameter and the perpendicular. This proportion must depend on parallels or on similar figures; presumably, after examination of the figure, on similar triangles. The most promising way of attempting to prove the triangles similar, since the conclusion concerns lines and a circle is given, is by showing that two angles of one triangle are equal to two angles of the second triangle. The pupil draws the diameter from either end of the chord, so as to have it in position to be used with the other given lines, and examines the angles, beginning with the known right angle, and using the circle in measuring the angles. The other auxiliary line is now self-evident, and when this point in the analysis has been reached the proposition is practically solved.

The principal function of the teacher in this method is to be a leader of discussion, helping the class to avoid difficulties, guiding the investigation in such a way as not to discourage the expression of all the original ideas the class may have, and yet keeping them to the matter in hand so that time is not wasted in useless digressions. This does not mean that a wrong lead is not sometimes followed when it might seem to the pupils a natural method of attack; as a matter of fact, the following up of unusual suggestions often leads to proofs that are new to the teacher. This discovery of several proofs for the same proposition is one of the interesting features; as many as 11 proofs of one theorem, some of them almost if not quite unknown, have

been discovered by the pupils, some proofs with guidance from the teacher and others without it.

When a class is for the first time developing some new part of the subject, a very interesting recitation is sure to follow. A pleasure in discovery, or at the least in contributing some part to a discovery, is awakened, and the amount of new work that can be developed in one period and left to the class to put in finished form is, after the class is well grounded in the fundamentals and the methods of attack, an astonishing feature.

The beginning of the course is never hurried. Like any logical faculty, the geometrical sense is of slow growth, and a thorough understanding of the elements is so vital to progress that whatever time seems needed is given to the first book of geometry. After this part is well in hand the course moves on more rapidly, so that in the end time is actually saved. An average class can finish the subject, including a large number of exercises of various types and a great deal of drill on interdependence of theorems and on methods of attack, in a little more than three-quarters of the time allotted to it, thus leaving time for a thorough review of the subject matter and for plenty of practice on college entrance examination questions.

The success of this method of teaching geometry seems to be proved by the interest shown in the classes while such recitations as have been described are in progress, and by the increased logical strength of pupils so trained. It is not a cure-all, and should not be regarded as claiming impossibilities, for its excellence lies simply in the fact that it attempts to awaken and to train whatever logical faculties each student may possess. The relative ability of different students is not materially changed, but each pupil is encouraged and trained to use his logical power to as great an extent as he is capable, and each grows according to his potentialities.

For those who are interested in the details, I will add sample developments, the answers expected from the pupils being in parentheses, and explanations in brackets. Many of the questions and answers are in rather condensed form.

REVIEW LESSON.

Topic: *Proportions between sects.*

What is the most fundamental way of proving a proportion? (By the use of parallels cutting transversals.) What is the most important special case of this? (A line parallel to one side of a triangle.) What is the next way of proving a proportion? (By using corresponding parts of similar polygons.) What special case of this is of most importance? (Triangles.) When proving a proportion by triangles, which method of showing the triangles similar is most likely to be used? (By two angles equal.) Why? (Since the conclusion is to be a proportion between the sides, it is not as likely that such a proportion will be known at the start.) Is any other way possible? (Yes; two sides proportional and the included angles equal.) What will the new proportion be in that case? (The third sides proportional to a pair of those

used in the given proportion.) State three proportion theorems depending on similar triangles. [Different pupils are called on for the parts of the answer.] Outline the proof of each. [Pupils do so without figures, indicating the general method and the important steps. Questions are asked relative to the points likely to make trouble, and if the teacher is not certain that the pupils have visualized the figures and followed the proofs, the figures are then drawn on the board and discussed.]

DEVELOPMENT LESSON: NO THEOREM STATED.

Topic: *Trapezoids.*

Define trapezoids. Is anything additional known from the definition alone? (It has two pairs of supplemental angles.) [It is sometimes best to compare with parallelograms, which also have two pairs of supplemental angles.] We will use this recitation to find out all we can about trapezoids, and especially to see what theorems about triangles are also true of trapezoids. In order to do this, suggest a way to divide a trapezoid into figures you have already investigated. [Division into two triangles and into a triangle and a parallelogram are suggested; the triangle suggestion is found of little advantage at this stage, and the triangle and parallelogram division is decided upon.] What is known about the parts of the triangle formed? (The base of the triangle is the difference of the bases of the trapezoid, and the sides of the triangle are equal to the legs of the trapezoid; the base angles of the triangle are equal to the base angles on the longer base of the trapezoid.) State a theorem that applies to this triangle. (If two sides of a triangle are equal, the opposite angles are equal.) [Some other theorems may be suggested first, and can be used equally well if it can be extended to the trapezoid; if not, that fact can be shown.] Show that this theorem applies to the trapezoid. [A pupil does this when other theorems are called for, and the most familiar and important ones, such as the converse of the one already mentioned, and the unequal case, are stated and shown to apply to the trapezoid.] What about the angles on the shorter base? (Equal if the other pair are equal, and unequal in the opposite sense if they are unequal.) Why? (They have been shown to be supplemental to the base angles on the longer base.) What other lines in the trapezoid might we examine? (The diagonals.) Suppose an isosceles trapezoid with the diagonals drawn, what do you think is likely to be true of the diagonals? (They are equal.) What method of proof is most likely? (Corresponding parts of congruent triangles.) What triangles can be used? [Pupils name them and show them congruent.] Does this prove anything besides the diagonals equal? (The corresponding angles are equal.) Can these angles be used for any new fact? (The triangles from the ends of the bases to the intersection of the diagonals are isosceles.) [The recitation can be continued until every desired fact about trapezoids is found. The continuation of the legs to form a triangle, as well as the triangle formed by drawing a line from one vertex parallel to the other diagonal, might be investigated; the subject is prolific of simple facts, and is one of interest and of importance in relation to other figures. When it is finished, the student should have a good idea of the trapezoid and its properties. This is of course but one of many such investigations that are suited to a class discussion.]

DEVELOPMENT OF A PROPOSITION.

Statement: *To inscribe a regular decagon in a given circle.*

[This is chosen as a sample because it is one of the difficult propositions, and at first thought might not seem likely to develop readily. As a matter of fact, some pupils discover it practically without suggestion by applying the analysis method of attack.]

What is the best way to discover a construction? (Draw the required figure free-hand, and by analysis try to find out how to construct it.) Suppose the circle O to be

given, and let AB be a side of the required decagon; what can you suggest? (Draw OA and OB.) How can you use the condition? (Angle O is one-fifth of a straight angle.) What else is known about the figure? (The triangle is isosceles, so angle A and angle B are each two-fifths of a straight angle.) What can be done to make use of the relative sizes of these angles? (Bisect angle B.) Why? (To form another angle equal to angle O.) Call the bisector BP; what is now known about the angles of the figure? [The pupils determine the size of each angle in terms of fifths of a straight angle.] What follows from this? (The small triangles are isosceles.) How many different lengths have the sects in the figure? (Three.) And what relation have the three? (The sum of two equals the third.) Which one is known and can therefore be used as a basis of length? (The radius.) Call it r ; which do we wish to find? (The chord.) Call it x ; how long is the third sect? ($PA=r-x$.) Have we made all possible use of the bisector BP when we use only the fact that it makes equal angles with the arms of angle B? (It also divides the line OA into parts proportional to the arms of angle B.) Give the proportions in terms of r and x . ($r/x = x/(r-x)$.) Are these sects all in one line? (Yes.) Then in what way is that line cut? (In mean and extreme ratio.) Then we have found that in a regular decagon the side is what? (The mean sect gotten by dividing the radius in mean and extreme ratio.) What would be the converse statement? (If the mean sect of the radius is used as a side of an inscribed polygon, the figure is a regular decagon.) But does the converse always hold? (No.) How do we find out whether it holds or not? (Take each "given," and see if the figures formed are the same.) In this case? (Take an angle equal to one-fifth of a straight angle, and a different chord equal to the mean sect, and see if each gives the other.) Do it. (The given angle has its chord equal to the mean sect by the proof just given: The chord taken is therefore equal to this chord, and must have an equal central angle; therefore the chord given equal to the mean sect has a central angle equal to one-fifth of a straight angle, and so is the side of a regular decagon.) What do you conclude to be the method of inscribing a regular decagon? (Cut the radius in mean and extreme ratio, and use the mean sect as a chord.) Why is it regular? (It is inscribed and equilateral.)

NOTE.—Soon after writing this development, one of my classes took up this proposition. I was much interested to see that the answers followed the plan given here almost exactly. If a stenographic report had been taken it could hardly have been more accurate, in content at least, than was this forecast of such a recitation. The only difference was that the class went on and found two other methods of proving the construction.

SAMPLE GEOMETRY TEST.

Given in February, 1911, to a beginning class that had studied rectilinear figures, including triangles, parallels, and parallelograms. The questions were not counted of equal value. Time allowed, one hour.

- I. What is the sum of the interior angles of a polygon? Of the exterior angles? Prove one. Can there be a polygon such that the sum of its interior angles is five times the sum of its exterior angles? One such that the square of the number of straight angles in the sum of its interior angles is four times the number of straight angles in the sum of its exterior angles? Prove both answers, showing your method clearly.
- II. What is the most fundamental way of proving triangles congruent? What is the principal use of congruence? List the ways of proving triangles congruent that use equal parts. How can corresponding parts of congruent triangles be recognized?
- III. State three important facts about parallelograms, and prove one. What is a parallelogram, and how can this definition be used when a parallelogram is given?
- IV. Prove that if two angles of a triangle are unequal, the opposite sides are also unequal, the — (finish the statement.)

REAL APPLIED PROBLEMS.

[This part of the report was prepared by James F. Millis, of the Francis W. Parker School, Chicago, and relates to the work of that school.]

For a number of years the department of mathematics in the Francis W. Parker School, Chicago, has been experimenting along the line of teaching algebra and geometry in relation to their practical uses.

The Francis W. Parker School is primarily an experimental school. It was founded some years ago by Col. Francis W. Parker, whose name stands among those of the foremost leaders in the reform movements in education in the United States, for the purpose of putting to a practical test or carrying out certain fundamental ideas in the modern theory of education which he evolved or championed. In this democratic school each department has the greatest of freedom, both in regard to methods of teaching and to the organization of the content of the curriculum. The unifying influence in the work of the school consists of adherence to a few great fundamental principles in the modern theory of education, chief among them being that of self-activity of the pupil as a basis of all educative work, which demands that there be proper motivation of all school work and that the work shall relate to the experiences, interests, and needs of the individual pupil.

In conformity with these guiding principles, the aims of the mathematics work as planned in the high school are not merely those of mental discipline and preparation for college entrance, but it is the aim of the school that the student shall look upon the various mathematical subjects primarily as powerful and indispensable scientific instruments which the world has developed and uses in carrying on its practical work. Each mathematical subject has been developed, it is aimed to show, as a scientific body of principles and processes for use in solving certain types of problems that are actually encountered in the world's work. Algebra undertakes to solve problems of certain types, geometry problems of other types, calculus problems of still different types, etc.

Up to the present time the deviation in the work of the school from the traditional courses in algebra and geometry has consisted largely of two things: (1) Gathering together and using in the classrooms a large number of real applied problems of algebra and geometry that are encountered in ordinary everyday life in the various trades, in manufacturing, in the construction and use of various tools and measuring instruments, in science, in engineering, in architecture and designing, in carpentry, in sheet-metal work, in marine surveying, in navigation, and in many other fields of activity; (2) practical measurements, constructions, and field work.

In algebra a textbook has been used. But it has been supplemented by the use of mimeographed pages of practical problems. One important type of these problems consists of practical formulæ that are used in computation. These formulæ include, for example, those for computing the horsepower of engines, for computing wind pressure, for computing the draft in chimneys, for computing the deflections of beams, and a great variety of other such formulæ; simple electric formulæ, formulæ for computing the velocity of falling bodies, and other simple formulæ in elementary science, and the various formulæ used in practical mensuration.

The subject of algebra is approached through the use of these formulæ in making practical computations, beginning with those which express in symbols the simple rules of mensuration, interest, etc., with which the student is already familiar. Gradually and incidentally the idea of general number and literal notation, the use of exponents, signs of grouping, etc., are introduced as means of expressing and solving certain types of problems, and the student is in the midst of algebra before he knows it.

Similarly, the equation is developed as an instrument or device that is used in solving other types of problems. Enough real practical problems that are solved by equations have now been collected to supplant practically all of the traditional artificial problems that have filled textbooks.

In teaching geometry a very large collection of real problems has been made. Good applied problems of geometry are more easy to find than practical problems of algebra. These problems represent applications of all parts of elementary geometry, plane and solid. Many of them are problems of construction; many are problems requiring a proof; and others are problems of computation, based upon the theorems of geometry.

When the use of applied problems of geometry was first undertaken by the school they were mimeographed and placed in the hands of the students and used to supplement the "original" exercises of the textbook. With later classes the experiment was tried of teaching without a textbook, but placing in the students' hands mimeographed copies of a manuscript in which real applied problems were made an integral part of the subject. Finally, a textbook was evolved reorganizing the subject along new lines, emphasizing constructions, and, by incorporating the best of the applied problems that had been tried out, presenting geometry to the student, not as a mere exercise to be pursued for purposes of mental discipline alone, but as a scientific instrument for solving those problems encountered in the world's work for which it is adapted.

In addition to the use of real applied problems in the classroom, another phase of the work in geometry has consisted of practical constructions, measurements, and field work. For example, each pupil constructs on cardboard or metal a diagonal scale that will measure to hundredths of an inch. This is preserved and used in making accurate measurements in later problems or constructions. Its construction involves the problem of dividing a sect into any number of equal parts, and its use involves the principle of proportion in similar triangles. Students make an instrument called a quadrant with which they measure the altitude of the sun at different times of the year. The use of this instrument involves the principle that vertical angles are equal. The use of congruent figures is made in measuring the distances out of doors between points separated by obstacles. The principles of proportion are applied in determining heights and distances in the neighborhood. The plane table is used in measuring the distances between inaccessible objects, and in the construction of maps. This construction, measuring, and field work have proved of intense interest to students in the high school.

It is hoped to work out in a practical way, in the near future, the practical correlation of algebra and geometry with science and other subjects in the curriculum. A few points of contact of both algebra and geometry with physics, of algebra with chemistry, and of geometry with woodwork have been made. That much more of this correlation of algebra and geometry with other school subjects can be made is certain. For the student to see the subjects of algebra and geometry as scientific instruments that the world uses in its practical work is not sufficient; he should be able to use them to a considerable extent in the solution of practical problems arising in his own work in science, in the shops, etc. Problems that are the student's own problems are of the most intense interest, and it is in the solution of such problems that the greatest educational value lies.

The theoretical values of the use of these real applied problems in the mathematics work of the school are three. They lend real interest to the study of the subjects, and hence provide genuine, legitimate motivation of the work. They assist the student's knowledge to function by giving him practice while still in school in the use of that knowledge in the solution of problems such as he may encounter in later life. Finally, through their informational content a more adequate understanding of the environment in which the individual lives is afforded, and avenues of life interest opened that otherwise would remain closed to the individual throughout life. That the first of these values is a real one the school has already demonstrated.

A SECONDARY SCHOOL MATHEMATICS CLUB.

[This part of the report was prepared by C. W. Newhall, of the Shattuck School, Faribault, Minn., and relates to the work of a club in that school.]

The Shattuck School is a boarding school for boys of about 14 to 19 years of age. Its pupils come from many States, to be prepared for various colleges and engineering schools.

The mathematics club to be described was organized in 1903. Its membership is limited to the students of the senior class in mathematics, who have finished the usual course in plane geometry, have had two years' work in algebra, and are studying solid geometry, trigonometry, and advanced algebra. The instructor of the class acts as leader of the club and presides at the meetings.

The meetings are held on the evening of the weekly holiday, and, as an offset to the time devoted to the meeting, no preparation is required for the regular classwork in mathematics for the next day. Each of the 15 or 20 members is expected to prepare a report (requiring about 10 minutes for presentation) once in 5 or 6 weeks.

The object of the club is to study unusual and interesting mathematical topics which do not find a place in the regular curriculum. The subjects include topics from the history of mathematics, famous problems, puzzles, fallacies, and tricks—anything, in fact, which is capable of a mathematical solution or explanation, and which promises to be interesting. This last criterion is most important, for a voluntary club of school boys will not thrive if the meetings are dull. The program of last year, giving a list of the subjects discussed, is appended to this statement.

As the boys have had no previous experience in such work, they need help in the preparation of their reports. Brief outlines are furnished, giving rather explicit suggestions as to the treatment of the topic, what to include, and especially what to leave out. For historical topics it is easy to refer the student to books, but for such a subject as "Mathematical Symmetry in Nature" he must hunt more widely for his material and needs more suggestions. In taking up "Non-Euclidean Geometry," "Infinity," and "The Fourth Dimension" the leader must point the way with still more care, and with such a subject as the "Foundations of Geometry," he must open the discussion and perhaps do the larger part of the work himself.

A list of the books in the mathematical library of the school, which have been found most useful in the club work, is appended. A collection of some 40 or 50 articles on appropriate subjects taken from popular magazines is also available.

At each meeting three or four special topics are presented, all bearing on a single general subject. The special topics as well as the general subject for each meeting are listed in the program for 1909-10 referred to above. There is no prescribed form of presenta-

tion. Some of the boys speak from notes, referring perhaps to illustrations previously placed on the blackboard, others prefer to read selections directly from the books which they have consulted, while still others prepare carefully written papers which in some cases have been subsequently elaborated into graduation theses.

Each report is followed by informal discussions during which the speaker is expected to answer any questions which may be raised. The leader may come to his assistance in case of need or may add a brief comment upon the topic, but one of the cardinal principles of the club is that the boys shall do most of the talking.

For the purpose of giving some suggestion of the spirit of the meetings, we may describe in some detail the treatment of a subject which always arouses the keenest interest—puzzles and fallacies.

The subject is presented by first placing a fallacy or puzzle before the members and giving them a reasonable time for exercising their wits in its solution. At the end of the allotted period, the trick is “given away” if not already discovered, and the mathematical principle is explained.

An idea of the character of the fallacies discussed may be had by consulting, for geometric fallacies, Ball's, White's, or Ozanam's books on Mathematical Recreations; and for algebraic fallacies, Viola's Mathematical Sophisms. The puzzles include the innumerable card tricks which rest on some mathematical formula or some principles of arrangement and tricks by which the performer discovers one's age or birthday, the number of spots on a card, etc., by requiring one to perform a series of arithmetical operations whose result reveals the required number. The following example of this type was given at one of the meetings:

The performer chose seven other boys and, during his absence from the room, a ring was placed upon a certain joint of a certain finger of a certain hand of a certain boy. The right and left hands were numbered 1 and 2, and joints, fingers, and boys were also designated by number. The four numbers indicating the position of the ring may be designated by u , v , x , and y .

On returning to the room, the performer called for certain multiplications and additions of these four numbers resulting in the expression $1000u + 100v + 10x + y$. He then called for the result and, on being told that it was 4132, announced that the ring was upon the second joint of the third finger of Smith's right hand.

In conclusion, I may say that this mathematics club has proved to be a most interesting and valuable adjunct of the regular work of the classroom.

The members, to be sure, acquire no very profound knowledge of the subjects discussed but they do come to have a broader view of the scope of mathematics and—the most valuable result—they are stimulated to independent thinking.

PROGRAM FOR 1909-10.

First Meeting.—Algebraic Fallacies.

An informal consideration of certain proofs (?) that 2 equals 1, 1 equals 0, 1 equals -1 , etc.

Second Meeting.—Our Number System.

1. First notions of numbers.
2. Primitive numeration.
3. Development of decimal system.
4. The positional idea.

Third Meeting.—Number Systems and Symbols.

1. History of our Arabic symbols.
2. Number symbols of other systems.
3. Nondecimal systems.
4. Some problems in a nondecimal system.
5. The duodecimal vs. the decimal.

Fourth Meeting.—History of Arithmetic and Algebra.

1. Among the ancient nations.
2. Among the Greeks and Romans.
3. Among the Hindus and Arabs.
4. In Mediæval Europe.
5. The development of algebraic symbolism.

Fifth Meeting.—Numerical Curiosities.

1. Mystic properties of numbers.
2. Prime numbers, triangular numbers, squares, cubes, etc.
3. Magic squares.
4. Large numbers.
5. Number forms.

Sixth Meeting.—Numerical Curiosities (continued).

1. The number 9 and its properties.
2. Other curious numbers.
3. Mathematical short cuts.
4. Mental calculations.

Seventh Meeting.—Numerical Tricks and Puzzles.

1. Numerical tricks.
2. Numerical puzzles and catch questions.
3. To discover a number thought of.

Eighth Meeting.—Geometrical Tricks and Puzzles and Mathematical Games. Informal consideration; no formal reports.*Ninth Meeting.*—Card Tricks involving some mathematical principle of number or position. Problems on a chess board.*Tenth Meeting.*—Foundations of Geometry.

1. The assumptions.
2. Nature of space.
3. Definitions.
4. Logic of geometry.

Eleventh Meeting.—History of Geometry.

1. Beginnings of geometry.
2. Early Greek geometry.
3. Euclid and his immortal elements.
4. Recent developments in geometry.

Twelfth Meeting.—Famous Problems of Geometry.

1. Squaring the circle.
2. The duplication of the cube.
3. Regular polygons and polyhedrons.
4. Famous problems of solid geometry.

Thirteenth Meeting.—Foundations of Geometry.

1. Geometric assumptions.
2. The straight line, and how to draw one.
3. Non-Euclidean geometry.
4. Some criticisms of the class textbook.

Fourteenth Meeting.—The Mathematics of Common Things.

1. The mathematical principles of maps.
2. Optical illusions.
3. The carpenter's square.
4. Weighing and measuring.
5. Mathematical symmetry in nature.

Fifteenth Meeting.—The Fairyland of Mathematics.

1. The fourth dimension.
2. A visit to Flatland.
3. A visit to Infinity.
4. Curved space.

Sixteenth Meeting.—Higher Mathematics.

1. History of trigonometry.
2. History of logarithms.
3. Calculus, and other pleasures to come.
4. A world without mathematics.

REFERENCE BOOKS.

Below are appended the titles of a few books and pamphlets which have proved most valuable in the work of the club. Only publications in the English language are mentioned. Additional references will be found in Smith's "Teaching of Elementary Mathematics," Young's "Teaching of Mathematics," Withers's "Parallel Postulate," White's "Scrap Book of Elementary Mathematics," Ahrens's "Unterhaltungen und Spiele," etc.

This list does not include textbooks, nor articles in encyclopædias, magazines, etc. Among magazines frequently containing such articles of interest are School Science and Mathematics, The Open Court, The Monist, Science, The Popular Science Monthly, The Scientific American, etc.

(1) *Foundations and criticisms.*

Common Sense of the Exact Sciences.....	Clifford.....	Appleton.
Space and Geometry.....	Mach.....	Open Court.
Euclid's Parallel Postulate.....	Withers.....	Open Court.
Euclid.....	Frankland.....	Wessel & Co.
Non-Euclidean Geometry.....	Manning.....	Ginn & Co.
Geometric Axioms (Popular Science Lectures, Helmholtz.....	Appleton.	
2d series).		
The Thirteen Books of Euclid's Elements, Heath.....	Cambridge University Press.	
with Introduction and Commentary.		
Mathematical Monographs.....	Young.....	Longmans.
Lectures on Elementary Mathematics.....	Lagrange.....	Open Court.
Theories of Parallelism.....	Frankland.....	Cambridge Press.
Number Systems.....	Fine.....	Ginn & Co.
The Teaching of Geometry.....	Smith.....	Ginn & Co.

(2) *History.*

History of Mathematics.....	Cajori.....	Macmillan.
History of Elementary Mathematics.....	Cajori.....	Macmillan.
Short History of Mathematics.....	Ball.....	Macmillan.
Primer of the History of Mathematics.....	Ball.....	Macmillan.
Greek Geometry from Thales to Euclid.....	Allman.....	Dublin University Press.
History of Greek Mathematics.....	Gow.....	Cambridge University Press.
Euclid.....	Smith.....	Scribner.
The Story of Euclid.....	Frankland.....	Wessel & Co.
Famous Problems of Geometry.....	Klein.....	Ginn & Co.
Mathematical Monographs.....		Heath & Co.
History of Teaching of Elementary Geometry.....	Stamper.....	Teachers College, Columbia University.
Portraits of Mathematicians.....	Smith.....	Open Court.
The Teaching of Elementary Mathematics.....	Smith.....	Macmillan.
Rara Arithmetica.....	Smith.....	Ginn & Co.
Sixteenth Century Arithmetic.....	Jackson.....	Teachers College, Columbia University.
The Hindu-Arabic Numerals.....	Smith and Kar-pinski.	Ginn & Co.

(3) *Recreations.*

Scrap Book of Elementary Mathematics.....	White.....	Open Court.
Mathematical Recreations.....	Ball.....	Macmillan.
Mathematical Essays.....	Schubert.....	Open Court.
The Canterbury Puzzles.....	Dudeney.....	Dutton & Co.
Paradoxes of Nature and Science.....	Harpson.....	Dutton & Co.
The Number Concept.....	Conant.....	Macmillan.
Philosophy of Arithmetic.....	Brooks.....	Normal Publishing Co., Philadelphia.
Recreations in Science and Mathematics ¹	Ozanam.....	
Scientific Romances.....	Hinton.....	Swan, Sonnenschein & Co.
Fourth Dimension.....	Hinton.....	Swan, Sonnenschein & Co.
Flatland.....	Anon.....	Little, Brown & Co.
Geometric Exercises in Paper Folding.....	Row.....	Open Court.
How to Draw a Straight Line.....	Kempe.....	Macmillan.
Geometry and Faith.....	Hill.....	Lee & Shepard.
Short Cuts and By Ways in Mathematics.....	Blakie.....	
Visit to Algebra Land.....	Ward.....	Educational Publishing Co., Syracuse.
Primitive Culture, Vol. I.....	Tylor.....	Henry Holt.
Magic Squares and Cubes.....	Andrews.....	Open Court.
The Fourth Dimension.....	Manning.....	Munn & Co.
Pleasure with Profit.....	Leybourn (1693).....	Out of print.

¹ Translated by Hutton; out of print; only second-hand copies obtainable.

CONCLUSION.

The preliminary classification of schools has been used comparatively little in describing courses of study and methods. Although location, religious connection, and various features of organization were considered in making tabulations, few distinctions between these various types of schools appeared in the data bearing upon the teaching of mathematics. The classification, while unnecessary for describing differentiation in courses and methods, has been retained because of its value in a description of the general characteristics of the schools included in the report.

The data reported by the schools have been presented as accurately as possible, with almost no comment. The report is not a complete description of mathematics teaching in private secondary schools, and we have indicated roughly limitations to the reliability of the figures, but in this form the report should be of more value for comparison of the schools of this field with the others than if interpretation reflecting the personal convictions of the members of the committee had been given.

In the discussion of aims, however, criticism of the prevailing views with regard to certain questions is perhaps implied, and in closing the report a word of commentary may be permitted. The statement in regard to coeducation and to the various questions of aim show that few teachers are in the habit of analyzing their problem carefully. One of the greatest needs of mathematical education in secondary schools to-day is the scientific determination of its legitimate purposes. Teachers should be less content to be guided by an examination requirement or to have blind faith in the supreme value of their subject. There should be a conscious purpose in all teaching and frequent attempts to measure results.

APPENDIX.

The following reports relate to institutions which, though not secondary institutions exclusively, cover more or less of the secondary field in their work.

A. MATHEMATICAL INSTRUCTION FOR EVENING TECHNICAL SCHOOLS.

Meeting requirements of compulsory education.—With the exception of some privately endowed schools, the evening schools have in the past made but little attempt to provide mathematical instruction of a sort that would meet the requirements of men and boys engaged in our constructive industries. In fact, most of the instruction in mathematics has been of an elementary order, meeting only the various legal requirements in the several States with reference to employment certificates. For the benefit of those who are unfamiliar with the spirit of such laws, the following extract from the education law of New York State is given:

Every boy between 14 and 16 years of age * * * who is engaged in any useful employment or service in a city of the first class or a city of the second class and who has not completed such course of study as is required for graduation from the elementary public schools of such city, and who does not hold either a certificate of graduation from the public elementary school or the pre-academic certificate issued by the regents of the university of the State of New York or the certificate of the completion of an elementary school issued by the education department, shall attend the public evening schools of such city, or other evening schools offering an equivalent course of instruction, for not less than six hours each week for a period of not less than 16 weeks in each school year or calendar year.

The intent of all such laws has been to provide for the illiterates. Consequently evening classes have been filled with boys and men of all ages, interests, and capacities, who could hardly understand the language of the classroom and who knew even less about the simplest operations of arithmetic.

Such a procedure naturally developed a series of elementary evening schools with little or no plan beyond that of meeting the State laws. Furthermore, the pupils themselves were practically driven to these schools by officials appointed to enforce compulsory attendance.

Development of evening high schools.—A series of evening high schools has gradually been developing in the larger cities. These

schools have reached a higher class of pupils—young men and women who could do more than read and write.

At first, many of them were naturally studious and sought with definite purpose educational advantages in the lines of algebra, geometry, and trigonometry. Many were preparing for entrance to some college while at the same time they were earning a living.

Later the commercial courses were introduced. They appealed to a much larger constituency, who were perhaps not naturally studious and yet who sought definite instruction in commercial arithmetic, bookkeeping, etc.

Within the last 10 years the shop and laboratory courses of our manual-training and technical high schools have been made available to the pupils of the evening schools. Thus we find another broadening out of evening instruction, meeting the needs of boys and men working in manufacturing industries.

Present weakness.—We note how the public evening schools have broadened their scope so far as educational activities are concerned. The same can not be said with reference to the method of instruction pursued, for in too many instances it has been haphazard, indefinite, and unorganized. Day-school teachers, unfamiliar with the special needs of evening students, have been engaged; textbooks written for the day elementary and high schools have been adopted; methods of teaching peculiar to the requirements of the immature day-school pupil have been thrust upon the mature members of the evening classes.

Privately endowed schools.—Fortunately, throughout the period of the development of the public evening school which has been briefly described, certain institutions—notably, Cooper Union, in New York City—have been steadily building up a comprehensive scheme of evening instruction which definitely meets the individual requirements of those engaged in technical work. Courses of instruction covering a definite period of years, trained teachers, special notes, and general improvement based upon previous experience, have made these schools leaders in the field of evening technical instruction.

Main purpose of the report.—The movement toward better public evening school instruction along lines of technology is so recent and the number of privately endowed evening schools of the same order so few that this report is necessarily limited in its statement of any definite development of high grade institution. Perhaps, after all, it can serve no more useful purpose than to outline some fundamental points which must be considered if such instruction is to be more effective, particularly in view of the fact that these points have been suggested by the answers to inquiries sent out by the committee.

Form of blank.—A series of questions was sent by the committee to all evening trade, technical, and industrial schools, covering the following points:

1. Nature of school—academic, or technical, or trade school.
2. What degrees granted, if any; and for how much work.
3. Number of years required for full course.
4. Approximate number entering each year.
5. Approximate number graduated each year.
6. Nature of course in mathematics. Is mathematics taught with relation to the students' occupations?
7. Number of hours per week devoted to the various mathematical subjects.
8. What textbooks are used?
9. Are these satisfactory; or if not, in what points are they defective?
10. In what way could the textbooks you use be bettered, if any?
11. What is the business of the night instructors during the day-time; that is, is it at all related to those subjects which they teach at night?
12. What is the average proportion of your instructor's salary for his evening work to his day salary?
13. In what way could the "personnel" of your instructing staff be bettered, if any?
14. What proportionate amount of time should be given, in your opinion, to the various branches of mathematics?

The following is a summary of the replies to the more important of these questions:

Improvement of evening schools.—An important educational move in the immediate future should be in the direction of improving the instruction in evening schools and adapting them to the needs of industrial workers. The methods of these schools should be recast. They should adapt themselves to modern industrial conditions, and through proper instruction of practical subjects touch more closely the economic and social life of the times. The evening school student attends to satisfy a definite need. These students have already received a more or less formal education in the public schools. They are receiving in their daily work incidental industrial experience, and have learned from this thorough teacher that they are deficient in some lines; hence this endeavor, outside of their working hours, to fit themselves for definite lines of activity.

Vital needs.—There are certain vital needs in the organization and methods of conducting evening industrial improvement schools. The evening technical school deals with two rather distinct classes: First, those who are naturally students and seek with a definite purpose educational advantages in the advanced lines of mathematics, and

mechanics; second, those who are not naturally students and yet who seek with a more or less definite aim educational help in a solution of some present problem which involves special service. The latter class is interested in shop mathematics, elementary engineering practice, etc.

Courses must be of two kinds.—The recognition of these two classes means that the courses of instruction must be of two kinds, one comparing favorably with the day-school work in its general scheme, the other and major part differing decidedly from the methods ordinarily pursued. The evening work of the nonstudent class must have its own distinct ideals, methods, and estimates of value based upon current community conditions and individual needs rather than based on the regular school standards which are applicable primarily to the student class.

Teaching staff.—Day-school teachers are employed too much at present in evening schools. These teachers can meet the needs of the student class, but they can not properly teach the nonstudent class which often consists of industrial workers. To the custom of employing day-school teachers must be laid much of the lack of definiteness in the planning of evening-school work. It is a very simple matter for the average day-school teacher to adopt the regular textbooks and to use the regular outlines and methods. This is a perfectly consistent action, for few regular teachers have opportunity to know the vital industrial needs of their students through their own academic experience. Now, the only people competent to teach in our evening industrial and technical schools, even on the book side, are the men and women who know from their contact with modern industrial and commercial life vital points of interest which concern these workers who come to the evening schools to meet definite needs.

A few typical answers to question No. 11 will show how few instructors are in touch with the practical aspects of technical problems relating to their mathematical teaching.

"Three teach mathematics during the day." "We employ day-school teachers." "Practically all our teachers teach the same subjects in the day school." "Both are teachers in the day school." "Teach mathematics in the daytime." "Teacher in grammar school." "All teach in day schools."

Contrasted with these statements are those from the majority of the evening technical institutes like Franklin, Cooper, and Lewis.

"Only two of our day-school teachers teach in evening school." "Night instructors are employed in engineering work during the day." "Part are teachers; remaining ones are engineers and draftsmen." "Most of our teachers have been with us for many years and are thoroughly capable."

The direct appeal.—Evening school instruction must appeal to the student immediately at the beginning of his work. The subject matter of the early lessons must satisfy his need as he has defined it. The success of evening instruction depends upon this principle. For example, a young machinist has received a reprimand from his foreman because he can not estimate the amount of "set-off" of the tailstock of a lathe to cut a taper. He enrolls in a class in trigonometry to meet that deficiency and finds that the first two lessons are concerned with definitions, the next three with quadrants and tables, and that the remainder of the term is to be spent on the development of formula. During this time he is receiving in his daily work the same reprimands, and is therefore debating in his own mind the value of his evening instruction. The average apprentice machinist does not see the direct application of this instruction to his work. He enrolled for a definite purpose. It would have been perfectly possible to give in the first five lessons some elementary but practical instruction in the application of the right-angled triangle to the offset of a tailstock. Instead of leaving school at the end of the fifth lesson with no instruction which appealed to him, he would have received enough in those five lessons to fit him to meet the demands of his foreman and more than likely he would have remained in the mathematical class to receive the more definite and thorough instruction in its theory which must be gained if one is fully to comprehend and cover the entire range of the subject.

Flexible courses.—The various features of the different courses in mathematics must be elective and flexible and presented in small and varied units. Instead of printing in a course of study "arithmetic," "geometry," etc., there should be printed, "arithmetic for mechanics," "arithmetic for clerks," "mechanical drawing for apprentices," etc. Where it is possible even a finer differentiation is desirable, such as "arithmetic for plumbers," "arithmetic for errand boys," "geometry for machinists," etc. Not only will this presentation serve to catch the eye of the prospective student, but it will also suggest to him that special effort is to be made in the class work to help him in his daily occupation. The instruction in the various branches must be adapted to the needs of the various occupations. The terms used in the classroom must savor of the shop, office, and store. Experience shows that the problem "What is $\frac{3}{4}$ of $37\frac{1}{2}$?" does not appeal so much to a clerk as the problem, "What will $\frac{3}{4}$ of a yard of cloth cost at $37\frac{1}{2}$ cents a yard?" On the other hand, the latter problem does not awaken the interest of the mechanic as much as the problem involving the same operations, which reads, "If a copper casting weighs $37\frac{1}{2}$ pounds and specific gravity of iron is $\frac{3}{4}$ that of copper, what will the casting weigh if made of iron?"

Departmental system is not always suited.—Oftentimes the students will do better work and more will be accomplished if the mathematical instruction is definitely related to the vocational work and is given by or under the direction of the teacher of the technical subject. For example, it is possible to teach the mathematics of steam engineering in connection with steam-engine practice. If the student sees the need of using a certain formula he can be better taught the derivation of that formula when the necessity arises for its use. In general, it may be said that the major subject in evening-school work is the vocational one—that is, the one related to the daily occupation of the student—and that all the other subjects, such as mathematics and science, are but incidents to the accomplishment of the vocational purpose. An illustration will serve to make clear: A machinist enrolls in an evening school for mechanical drawing and finds that he needs to brush up in fractions and decimals and that he needs square root in order to work out a formula for screw threads. The opportune time to teach him these topics is when the need for them arises, and none is more qualified to give the required practical instruction in such topics than a competent drawing teacher. The value of sending him to another class for a line of mathematics unrelated to his main “center of interest” is questioned.

Along the same general lines the following description of work in Lewis Institute, Chicago, may be cited:

The larger group, however, is composed of men and boys who must have a practical grasp of mathematical principles for their work in engineering. Here there is no attempt to teach mathematics as a thing apart from its applications. For the first 20 weeks the students in the first-year engineering principles, about 250 in number, meet two evenings a week for two hours. During the first hour in the mathematics lecture room a sheet of problems is given to each student, and the instructor works the problems on the blackboard and explains the principles involved. These problems are based directly on the second hour's work, which consists of a demonstration lecture in applied physics. Thus, in the physics lecture room a crane is set up, and spring balances are arranged to show the stresses in the boom and tie. The following evening in the mathematics lecture room problems on the crane and triangle of forces are solved and the mathematical principles are discussed. A motor-power test with the Prony brake is the basis for work and power problems. During the third term of 10 weeks the students spend two evenings a week in the laboratory and one evening in solving problems based on their laboratory work. At the end of the year each student has a set of sheets containing the necessary definitions, tables, and statement of principles from the physics lectures, a set of laboratory report blanks in which is a record of his laboratory work, and a set of problem sheets with a solution of the problems. These are bound for the students, and by this means they have a permanent record of the year's work for future reference and study.

During the remaining three years of the engineering work the mathematics is continued in the closest possible relations with it. All the while the methods of solving the various problems that arise are kept as simple as possible. A judicious use of arithmetic, a very little algebra, or a simple diagram secures results that are often obtained through elaborate processes involving lengthy operations and complicated equations. Many of the students learn to use a table of four-place logarithms, the

slide rule, and the table of series, cosines, and tangents skillfully and intelligently. We have learned that it is not necessary to tell a man that he can not enter an engineering class in the evening school till he has studied mathematics one or two years. He can get a working knowledge of mathematics through the problems.

In the Springfield (Mass.) Evening School of Trades the instructor of drawing used a method similar to the following:

When the student reached a place in a drafting course dealing with the subject of screw threads, it became necessary for him to apply some such formula as $P=0.24\sqrt{d+0.625}-0.175$, where P is the pitch of the thread and d is the diameter of the bolt. This problem involves square root and decimals. One hour of individual or small-group instruction by this teacher gave a student the necessary familiarity with these mathematical processes to make them sufficiently clear to him in their application to the formula.

Undoubtedly many students are not satisfied with this incomplete instruction, and this is often made evident through their joining the regular class in mathematics the next year in order to gain an insight into the reasons involved in the process of square root. Instead of thorough preparation in mathematics for mechanical drawing, it would be better to have the mechanical drawing lead the students into mathematics. This reversal of the usual procedure, while it may not be pedagogical so far as the subject matter is concerned, is certainly true to experience when one deals with the characteristics of the average evening-school student. The teaching of application before theory should be always emphasized in evening instruction.

Sequential arrangement of courses.—Mathematical instruction should have a sequential arrangement, elementary and advanced courses being given. Experience teaches that evening schools are so overcrowded in the elementary courses that the more advanced students suffer through insufficient attention. If the student's transient need is well met, it will place him in a better position, only again to make him feel a renewed need of self-improvement. This means that he will return to the evening school in some subsequent year, when he ought to be given advanced work. Not only must each school year's work be driven home and clinched, but each series of years' work must be so clinched as to meet the needs of industry. The strength of the work of such evening institutes as Cooper, Pratt, Lewis, and Franklin testifies to the value of sequential arrangement of courses.

Classification by ages.—Where possible there should be in the evening-school work a separation in the class instruction of the immature from the mature nonstudent class. The latter are extremely self-conscious. Their feelings should be respected as far as possible. Is it any wonder that a foreman of a pattern shop does not take kindly to being instructed in arithmetic in the same class with a boy machine tender over whom he has charge during the day?

Classification by vocations.—Undoubtedly, as far as is possible, students should be classified in the mathematical classes according to their trade or business. To-day workingmen have common trade interests. Evening-school students grouped according to occupation would have an opportunity to talk over these interests. The teacher

could act as a leader and draw out the students into telling their trade experiences, and through the expression of these various opinions the most practical solution of the particular problem at hand would be obtained. Teachers who have had evening-school experience know how difficult it is to get the students to recite and express themselves at the blackboard. A free discussion of the point at issue makes the student lose his self-consciousness and before he is aware of it he is at the board illustrating his particular method of solution.

It is recognized by the committee that small schools will have difficulty in dividing the classes into occupational groups. However, any evening school with an enrollment which requires the formation of more than one class in a given subject can at least divide its class enrollment into two divisions: (1) Those engaged in mechanical, electrical, and steam-engine practice trades during the day; (2) those engaged in building trades during the day. The larger the enrollment the finer the differentiation as based upon the daily occupation of the students.

Textbooks for industrial workers.—Textbooks written expressly for the kind of instruction demanded in evening schools should be used. There should be a marked difference between the methods of instruction in day and evening schools. What is needed, for instance, is not an elaborate textbook in general arithmetic, with all its topics of fractions, decimals, square root, percentage, interest, partial payments, bank discounts, etc., but rather a book which appeals to a man in the machine trades, then one which appeals to a plumber, or a clerk, or an errand boy; small enough to slip into the side pocket of a coat and cheap enough so that he can readily own a copy for reference in his daily work.

Furthermore, there should be textbooks so arranged as to relate a series of questions to one given plan; it would be much better than a large number of totally unrelated questions. In addition it may be said that these questions should deal with simple actual problems.

B. THE TEACHING OF MATHEMATICS IN PRIVATE CORRESPONDENCE SCHOOLS.

Preliminary statement.—In the preparation of this report the most complete list of correspondence schools possible was obtained. The list showed that many of these institutions were of such nature that they did not give instruction in mathematics. In obtaining the data for the report the committee sent a blank which contained questions asking for the information desired by the general committee. One hundred and thirty-five correspondence schools, colleges, and universities doing correspondence work received these inquiries. Only a

small number replied. For this reason the conclusions in this report are drawn from insufficient data to make them of the highest value. Nevertheless, the replies received were from such institutions as make them fairly representative of the field covered by correspondence instruction in mathematics.

Historical sketch.—Instruction by correspondence is of comparatively recent origin. It was first successfully developed in Germany about the middle of the nineteenth century. The first attempts to introduce this method of instruction in the United States were in connection with the Chautauqua Literary and Scientific Circle, which organized a department of correspondence in 1884. Since then the work has extended throughout the country, and the correspondence method of instruction is employed not only by independent schools, but also by a number of the leading colleges and universities.

Two classes of institutions are engaged in instruction by correspondence. These are the independent correspondence schools—institutions doing all of their work by correspondence—and colleges and universities having correspondence departments. The following report is divided into two parts, the first part dealing with the independent correspondence schools and the second with correspondence departments of other institutions.

Independent Correspondence Schools.

Organization.—The plan of organization of independent correspondence schools varies somewhat in detail, but in their essential features all plans are nearly the same. No system of classes or class work exists, and instruction is with the individual student. With scarcely an exception these schools are entirely independent of other institutions of learning. However, those whose instruction is recognized as thorough often have their students accredited in higher institutions of learning which the said students desire to enter. This credit, it should be said, is a matter resting entirely with the accrediting school, and unless the student so accredited is able to sustain himself in the department which he enters, the credit is withdrawn. Nearly all of the best schools have courses which prepare their students for the freshman year of colleges and universities, but most of them are also highly specialized and devote the greater part of their time to preparing their students for the various vocations which these students wish to follow. For this reason the courses in mathematics and the instruction given are on a much more limited plane than courses of equal strength in high schools, colleges, and universities.

Courses of study.—The reports received show that arithmetic, algebra, and geometry are taught in a large majority of those schools which teach mathematics at all. A limited number have courses in

trigonometry and commercial arithmetic, and a still smaller number have special courses, by which is meant courses especially adapted to fitting the student for some vocation, such as accounting and electrical engineering. While the schools offering such courses are few in number, their patronage is very large, and most of the courses in mathematics which these schools offer are devoted to the various lines of industrial work.

Methods of instruction.—The method of instruction is practically the same in all of these institutions. Texts are sent the students and they are required to prepare the lessons assigned on these texts. When the lesson is prepared the student writes his lesson paper, answering questions and solving problems required by the school. This paper is forwarded to the school, where it is reviewed, criticised, and usually graded; then returned to the student, together with such suggestions and directions as the instructor feels that the student needs.

The plan of sending out the lessons varies. Some schools send at once a volume containing all the lessons of the course; others send pamphlets containing one or two lessons each, and when the course is completed, present the student with a bound volume containing all the lessons previously sent in pamphlet form. The questions for the lesson paper may be in the text or they may be sent from time to time as the student requires them. The schools vary also in their plan of assisting students. Some schools send along with the first lessons carefully prepared directions for study, and others give these directions from time to time as the lesson papers are returned. In every case the student is thrown upon his own resources in the preparation of his lesson and his lesson paper.

Textbooks.—In the matter of supplying students with textbooks three plans are followed. Some schools use a special text, prepared by their own instructors and adapted to the needs of their students. Others use the regular texts employed in residence work, sending the students questions based upon the lessons in these texts. The third plan uses the regular textbook and supplements it by a correspondence instruction book, in which the lessons are outlined, instructions for study given, and occasionally supplementary exercises added. These instruction books in most cases also contain the questions upon which the lesson paper is based.

The special texts used in correspondence instruction are prepared as carefully as those used in residence work. Nevertheless, these same books differ widely from the general textbooks on the same subject. Concerning this the report from one of the schools makes the following statement:

The aim of the author of the ordinary textbook is to produce a work that may be used by all who wish information that would naturally come under the heading under which the book would be classified, and he is not at liberty to restrain the scope of his book by leaving out sections which are ordinarily included in works of that character.

The leading correspondence schools, however, are constantly and deliberately violating all recognized rules of textbook making. They aim to give the student exactly what he wants and needs in connection with the particular line of study he desires to pursue, and to give him no more and no less, and the books are prepared in such a manner that the student can obtain the information desired in the shortest possible time.

Furthermore, the makers of these books aim to make them so clear that they can not be misunderstood by one of average intelligence, and to make all explanations so complete that the student will have no trouble in interpreting them for himself. In the correspondence textbook, in other words, all the difficulties of the student are as far as possible anticipated, because the author keeps constantly in mind the fact that many of these students can not get assistance from any one except by writing to the school, and in some instances it may take several weeks or even months to obtain an answer.

Another important particular in which the correspondence text varies from that for residence work is in the space it devotes to those particular phases of the subject needed by the student; that is, the arithmetic for use in a course of engineering will contain much more upon the subject of evolution than is found in the ordinary arithmetic of similar grade, while it may contain little or nothing on the subject of denominate numbers or of percentage.

The textbooks in mathematics prepared by correspondence schools are particularly "doing" books. They show the student how to arrive at the results he must attain in the shortest and most practical way, omitting the discussion of principles or the reasons underlying the formula and rules given. They prepare the student to perform some special line of work, but in gaining this preparation he acquires little or no power to solve problems in other lines of work, unless they are very closely related to the course which he has studied.

Conclusion.—The committee found no independent correspondence schools which have special courses in mathematics for the preparation of teachers of this subject. Some of them offer review courses with a view to assisting the teachers, but these are limited in extent and apparently contain but little in the way of directions for teaching.

In the matter of examinations the committee found no uniformity whatever. Some schools require examinations at stated intervals; some when the course is completed, and others consider each lesson paper an examination, and when the last paper is received consider the course to be completed. If the student has met the required standard a certificate to this effect is returned to him with his last paper. Where examinations are given there is also a wide difference in the value assigned them in determining the student's standing at the completion of his course. Some schools consider them to be of equal value to lesson papers; others consider the final examination to have two-fifths of the value of the recitation papers and few place but little value upon them. From the reports concerning examinations the committee was unable to draw any satisfactory conclusion. Considering the reports as a whole, it would seem that less attention was paid to written examinations in correspondence work than is usually assigned that subject in residence work.

Universities and Colleges.

Organization.—All colleges and universities reporting to the committee state that their correspondence work is organized as a department of the institution. These departments have no direct connection with other schools, but without exception the credits gained through correspondence work with colleges and universities are accepted not only by the institution giving the course, but by any other university, college, normal school, or high school to which the student applies for admission.

Courses of study.—Most of these institutions offer courses in correspondence parallel with those offered in residence work. One replies: "We offer courses in elementary algebra covering one year of the usual high school course; plane geometry covering one year of high school work; solid geometry representing the usual half year of high school; higher algebra representing the half year of advanced high school work; higher algebra representing one semester of freshman work in a university and trigonometry covering plane and spherical trigonometry and representing one semester of freshman work." One of these, a State university which has established a very extensive correspondence department, offers 12 courses of elementary grade and 6 courses of university grade. Six of the elementary courses are vocational, each being designed especially for the purpose of assisting those who take it in the particular vocation they are following. In this respect these courses and the texts containing them follow very closely the plan of similar courses prepared by independent correspondence schools doing industrial work. The elementary courses and those of university grade in this institution are similar to the same courses provided for residence work.

Methods of instruction.—Methods of instruction in vogue in the correspondence departments of colleges and universities are practically the same as those employed by independent correspondence schools. However, a larger proportion of these institutions use the ordinary textbook, expecting their students to prepare their lessons from these texts as best they can. When these texts are used, questions upon which the lesson papers are based are sent the students at regular intervals. Some of these schools send students special instructions with the return of their lessons or with the assignment of lessons.

Preparation of teachers.—From the replies received it appears that a majority of colleges and universities maintaining correspondence departments provide through these departments for the training of teachers in mathematics to a limited extent. An occasional institution gives a special course for this purpose, but the others give the work in connection with an ordinary course in the subject studied, as in arithmetic or algebra.

The requirements for admission to these courses vary somewhat widely. Some institutions will not allow undergraduate students to take teachers' courses. Others open these courses to those who have completed a four-year high school course and two years' work at a good university or college. Some of these institutions require the candidate to enter upon a course leading to the degree of Ph. D. and to do a part of the work in residence, devoting at least one-third of his time to giving instruction in undergraduate classes. Another institution in addition to the work in mathematics requires the study of the pedagogy of mathematics, a course which concerns itself chiefly with reasons and methods for teaching elementary mathematics, especially arithmetic.

Conclusion.—The replies received by the committee show that instruction through correspondence is rapidly increasing in our leading colleges and universities, and that no subject can be taught by this method more successfully than mathematics. Some of the State universities are using this method of extending work to reach a large number of people within their respective States who desire mathematical training to assist them in their various vocations. In neither the universities and colleges nor the independent correspondence schools do we find uniformity in courses of study or requirements for admission to the courses or standards for securing evidence that courses have been completed. The courses in methods of the universities and colleges, with the exception named, follow more closely similar courses for residence students than do those of the independent schools, and reports from all institutions complying with the committee's request show that the work accomplished is of such nature as to be of permanent benefit to the student.

C. THE TEACHING OF MATHEMATICS IN SCHOOLS AND COLLEGES FOR NEGROES.

Source of data.—The following report is based largely upon material furnished by the following well-known schools and colleges for negroes:

Atlanta Baptist College, Atlanta, Ga.

Atlanta University, Atlanta, Ga.

Fisk University, Nashville, Tenn.

Florida Agricultural and Mechanical College, Tallahassee, Fla.

Shaw University, Raleigh, N. C.

Talladega College, Talladega, Ala.

Virginia Union University, Richmond, Va.

Hampton Institute, Hampton, Va.

Armstrong Manual Training School, Washington, D. C.

Colored High School, Baltimore, Md.

St. Augustine's School, Raleigh, N. C.

Character of the work.—Owing to the poor instruction in the elementary public schools generally, the schools of secondary and higher grades for negroes are compelled in most cases to offer elementary courses also. And even when the teaching happens to be good in the elementary school the chances are that the upper grammar grades are not given. In order, then, to connect their courses with the ordinary elementary-school courses it is necessary for the private schools to do some elementary work. The bulk of the work of high-school and college grade among colored people is done in these private schools. There are comparatively few high schools and colleges for colored youth maintained at public expense. Most of the private schools and colleges carry all of the elementary grades from the first through the eighth, and all of them have at least the last one or two grammar grades. In the best of these schools the work of a given grade is about the same as that in the corresponding grade in northern public schools, but the pupils are often considerably older. In the public schools the grades fall somewhat behind similar ones in the North.

The curriculum.—In the schools for negroes, then, the work in mathematics is about as follows:

Elementary school. Years I–VIII, inclusive. (Often only I–VII years are given in the public schools.) Five recitations per week, except in certain industrial schools like Tuskegee and Hampton with only three and four recitations per week. In the lower grades the periods are usually 30 minutes and in the upper at least 45 minutes.

Arithmetic usually is the only subject offered.

High (secondary) school.

IX. Algebra, 5 recitations per week.

X. Algebra, half year, 5 recitations per week.

Plane geometry, half year, 5 recitations per week.

XI. Plane geometry, half year, 5 recitations per week.

Solid geometry, half year, 5 recitations per week.

Advanced algebra, half year, 5 recitations per week.

XII. Mathematics rarely required.

The following are offered in a few cases:

Advanced algebra, half year.

Plane trigonometry, surveying, half year.

Analytical geometry, half year.

Mechanics, half year.

Mathematics of chemistry, half year.

Shop problems, half year.

Few of the schools give the work in mathematics in exactly the order given above. But nearly all of them devote about three years to the algebra and plane geometry ordinarily taught in a high-school course. Most of them require a year and a half for the elementary

algebra. For the plane geometry a year is usually given, but the schools vary all the way from a half year to a year and a half for this subject. A half year is the rather uniform time given to solid geometry. The latter subject and advanced algebra, however, are offered by but few institutions in their high-school departments.

College. The required work in mathematics usually covers only the first two years of the college course. Some choice of subject is often allowed in this period. But few schools offer other electives in subsequent years.

The following courses are commonly given:

College algebra, half year, 4 or 5 periods per week.

Solid geometry, half year, 4 or 5 periods per week.

Plane trigonometry, half year, 4 or 5 periods per week.

Spherical trigonometry (in a few cases).

Analytic geometry, whole year in a number of cases.

Surveying, half year.

Astronomy, half year.

Most of the schools do not offer analytic geometry or spherical trigonometry. But several of them not only give these subjects, but differential and integral calculus also as electives. Such schools are Howard University, Fisk University, Virginia Union University, Atlanta University, and possibly some others.

The work in arithmetic in the grades.—The work in arithmetic is usually routine and conventional, following the textbook, with little regard for the choice of subject matter. Some of the better schools are beginning to eliminate obsolete material and to leave such subjects as square and cube root for work in algebra. Too often by far the teaching is abstract and usually without practical applications. The most notable exceptions to these conditions are to be found in the model schools and teacher-training departments of the better schools, such as Spelman Seminary, Atlanta University, and the Whittier School, at Hampton Institute. With the work of these primary schools should be mentioned also that of industrial schools like the Calhoun Colored School, the Penn School, Tuskegee Institute, and Hampton Institute. In such institutions the arithmetic work is very concrete and the method of teaching mainly objective. Lines, solids, paper cutting, measures and weights are used in the teaching, and outdoor measurements are made by the students. Material for classroom exercises is taken from the fields, shops, offices, and industrial activities of the schools and their neighborhoods. And classes are taken into the shops and offices to see practical illustrations of the problems studied.

Secondary work.—The work in mathematics in the secondary or high schools for negroes corresponds favorably in subject matter with that of the ordinary northern high school. White teachers from the

North or colored teachers educated in northern schools have charge of most of this work.

The algebra covers at least elementary work, including ratio and proportion, radicals, radical equations, theory of exponents, and the binomial theorem, and in the stronger schools special drill in quadratics, complex numbers, logarithms, and the use of the graph.

The plane geometry is usually taken complete with original demonstrations, but in many schools a number of the original exercises are omitted. -

Solid geometry is taken complete.

The public high schools of Washington, D. C., offer perhaps a fuller course than any others of the secondary schools for negroes. In addition to the algebra and plane geometry usually given they have advanced algebra, plane trigonometry and surveying, solid geometry, plane analytical geometry, mechanics, mathematics of chemistry, and shop problems.

In these schools the teachers of algebra frequently visit the grades where arithmetic and elementary algebra are taught, so as to keep their work in close touch with that of the grades. Pupils coming from the grades find the transition less difficult for this reason.

In geometry pupils are required to make accurate geometrical constructions of figures embodying the conditions of the hypothesis for each theorem. Simple original exercises are begun early in the course and continued throughout. Particular attention is given to the development of general principles for attacking original problems. And the lesson assignments always include preparation for advance work.

The work in solid geometry begins with preliminary instruction in the best conventional ways of representing in drawings intersecting and parallel planes, and with a review of the idea of perspective in the representation of solid figures. An easy and rapid free-hand oblique projection is taught and insisted upon in the construction of all figures. Construction of cardboard models is encouraged at the beginning of the course.

In trigonometry the aim is to complete the simplest and most concrete part of the subject before taking up the more general and abstract parts. In the latter part of the course surveying is stressed, and the derivation of many of the formulas is reserved till some problem in surveying shows an actual need of them.

This work is fairly typical of what is done in the more advanced high schools and colleges with secondary grades. In the weaker institutions and in the industrial schools, like Tuskegee and Hampton, no courses above plane geometry are offered. In the latter schools particularly, the work in geometry is largely inventional. Many of the most important theorems are demonstrated and a good deal of

original work is done. This study supplements the courses in mechanical drawing. Its relations to the various trades taught are constantly shown.

Practical applications.—In arithmetic, problems of a practical character are used by the better institutions, as already mentioned. Geometry is used in mechanical drawing and in the work of the various trades. Mathematics is also applied in the work in chemistry, physics, and in the electrical engineering laboratories of some of the colleges, in such high schools as those in Washington and possibly in the new and finely equipped Sumner High School in St. Louis, the most complete public high school for colored youth in America, costing, with equipment, \$500,000. The schools for colored students are, however, not strong in applied mathematics. As President John Hope, of the Atlanta Baptist College, well says: "Openings in jobs that call for higher mathematical development have been almost absolutely closed to young negroes, so they have not had the incentive that white students have had along mathematical lines."

College Work.

Character of the work.—Apart from their weakness in applied mathematics, the colleges for colored youth do about the same kind of work as the northern colleges. They naturally do not offer so many courses. But they very uniformly give those indicated above. And they do their work with considerable thoroughness. The better students from the best of the schools are able upon completing their courses to enter the junior classes at Harvard and Yale, and a few have even been able to enter the senior classes. Many of the northern universities give them full college credit for their work in mathematics. In fact these students are more likely to compare favorably with northern white students in mathematics than in the natural and social sciences. For the latter the colored schools are not well equipped. Generally, as Shaw University reports, the graduate of the preparatory department of these schools is about a year below the standard of the typical high school, and consequently the college classes are below the standard to the same extent. There are, of course, exceptions and especially in the case of a few high schools in the border States.

Entrance requirements.—Since practically all these schools carry the elementary grades to some extent, there is no hard and fast requirement for admission to the institution. But the work of each department must be completed before a student is admitted to the next higher department. None of these institutions is more exacting in such matters than Atlanta University, which writes:

For entrance to the high school we require an examination in the arithmetic of the eighth-grade grammar school. The inability of many negroes, especially in the

country, to get good preparation forces us to be very lenient in these examinations; and a large percentage of our pupils have to spend two years in the completion of the work required of the first year.

For college entrance we require an examination in the mathematics of our high-school course or its equivalent.

This, for Atlanta University, means algebra, including quadratics, logarithms, and the use of the graph. Most colleges are not quite so rigid in their requirements.

For entrance to Hampton Institute proper, work that would prepare for a typical fifth grade is required. Tuskegee's requirements are no higher.

For the well-ordered city high schools the usual work of seventh or eighth grade is required for admission.

Requirements for graduation.—Very few of the schools offer more than one or two electives in mathematics. So that with the exception of spherical trigonometry and analytic geometry, and in a few cases surveying and astronomy, all the work set down above is required in the several departments as a rule.

The mathematical ability of the colored race as compared with the white race.—The general feeling in the institutions covered by this report is that the differences between the races in the matter of mathematics, in so far as any differences exist, are due to conditions rather than to race characteristics. In addition to this, it is interesting to notice the opinions given directly by the 11 schools contributing to this study. Five of them feel that there is no difference due to race. Two are of the opinion that colored students generally are not the equals of white students. One school was not able to make any comparison. Three did not reply to the question regarding a comparison of the races. Replies were made by both white and colored teachers who have had years of experience in colored schools and in some cases in white schools.



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OF THE UNITED STATES
BUREAU OF EDUCATION
AVAILABLE FOR FREE DISTRIBUTION

OCTOBER, 1911



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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, September 28, 1911.

SIR: The Bureau of Education at present has in stock, available for distribution, a considerable number of its publications of various dates, which should be of great service to teachers, school officials, librarians, and others interested in educational subjects. In order to bring this material to the notice of those persons to whom it is of value and into circulation, I have had compiled in the library division of this office a classified and annotated list, brought down to date, which is herewith transmitted for publication. Previous lists of publications of the bureau have presented a complete record, without annotations, of all titles issued, including those out of print.

Very respectfully,

P. P. CLAXTON, *Commissioner.*

The SECRETARY OF THE INTERIOR.

EXPLANATORY NOTE.

This bulletin names and describes the publications of the Bureau of Education which, at the time of its compilation (October, 1911), are available for free distribution by this office. Requests for titles from this list will be filled as long as the publications desired continue in stock, but it should be understood that the supply of many, especially earlier issues, is scant and likely soon to be exhausted. Many publications of the bureau, which can no longer be supplied by this office, may be purchased from the Superintendent of Documents, Washington, and are named in his Price List 31, Government publications relating to education. For a complete record of publications of this bureau, 1867-1910, its Bulletin, 1910, No. 3, should be consulted.

Publications in the following list should be ordered by publication number, which precedes each main entry, and is also given in parentheses after titles of reprints in the tables of contents of the reports. Separates of chapters or of sections of the reports should be requested by chapter number or by title. From the report for 1894-95 to that for 1910, inclusive, the commissioner's introduction and individual chapters listed can at present be supplied in separate form, except in cases indicated by an asterisk (*), which precedes sections and chapters not available for free distribution. No sections or chapters from reports prior to that for 1894-95 can be separately furnished, excepting reprints which are specifically mentioned in part IV of this list.

Many of these publications are of great value to teachers, students of education, librarians, and people having a general interest in education and the improvement of public and private schools.

LIST OF PUBLICATIONS OF THE UNITED STATES BUREAU OF EDUCATION AVAILABLE FOR FREE DISTRIBUTION, OCTOBER, 1911.

I. ANNUAL STATEMENTS OF THE COMMISSIONER.

[An account of the operations of the Bureau for each fiscal year.]

180.	1891	(Harris)	Washington, 1891.	21 p.
189.	1892	(Harris)	Washington, 1892.	21 p.
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4. 1871 (Eaton) Washington, 1872. 715 p.

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5. 1872 (Eaton) Washington, 1873. lxxxviii, 1018 p.

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6. 1873 (Eaton) Washington, 1875. clxxviii, 870 p.

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7. 1874 (Eaton) Washington, 1875. clii, 935 p.

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8. 1875 (Eaton) Washington, 1876. clxxiii, 1016 p.

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11. 1878 (Eaton) Washington, 1880. cci, 730 p.

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14. 1881 (Eaton) Washington, 1883. cclxxvii, 840 p.

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15. 1882-83 (Eaton) Washington, 1884. ccxciii, 872 p.

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16. 1883-84 (Eaton) Washington, 1885. cclxxi, 943 p.

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17. 1884-85 (Eaton) Washington, 1886. cccxvii, 848 p.

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18. 1885-86 (Dawson) Washington, 1887. xxi, 792 p.

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19. 1886-87 (Dawson) Washington, 1888. 1170 p.

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20. 1887-88 (Dawson) Washington, 1889. 1209 p.

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181. 1888-89 (Harris) Washington, 1891. V. 1, ix, 669 p.

182. Same. V. 2, vi, 671-1669 p.

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183. Part I of the Report of the Commissioner of education for the year 1888-89, with the Commissioner's introduction and table of contents of Parts I, II, III. Special edition. Washington, 1891. lix, 274 p.
198. 1889-90 (Harris) Washington, 1893. V. 1, xxvii, 601 p.
199. Same. V. 2, vii, 603-1724 p.

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207. 1890-91 (Harris) Washington, 1894. V. 1, xxx, 654 p.
208. Same. V. 2, 655-1549 p.

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211. 1891-92 (Harris) Washington, 1894. V. 1, xxviii, 636 p.

212. Same. V. 2, v, 637-1294 p.

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217. 1892-93 (Harris) Washington, 1895. V. 1, lx, 1224 p.

218. Same. V. 2, v, 1225-2153 p.

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221. 1893-94 (Harris) Washington, 1896. V. 1, xlvii, 1061 p.

222. Same. V. 2, 1063-2290 p.

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227. 1894-95 (Harris) Washington, 1896. V. 1, lviii, 1152 p. (not available as volume).

228. Same. V. 2, v, 1153-2314 p.

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233. 1895-96 (Harris) Washington, 1897. V. 1, lxxv, 965 p.

234. Same. V. 2, vii, 967-2173 p.

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238. 1896-97. (Harris) Washington, 1898. V. 1, lxxx, 1136 p.

239. Same. V. 2, vii, 1137-2390 p.

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[Attention is invited to chapters 23 and 24 as available separates of current utility.]

257. 1897-98. (Harris) Washington, 1899. V. 1, cxx, 1280 p. (not available as volume).
258. Same. V. 2, vii, 1281-2640 p. (not available as volume).

The following separates are available: The Commissioner's introduction, with statistics of state school systems, p. xi-xcvi. Courses of study in medical schools, p. xcix-cxx. Chapters: 2. H. B. Adams: Summer schools in England, Scotland, France, and Switzerland, p. 83-131. 3. Anna T. Smith: Education in Great Britain and Ireland, p. 133-167. 4. Anna T. Smith: Education in Canada, p. 169-187. 5. Anna T. Smith: Systems of public education in Australia, New Zealand, and Tasmania, p. 189-214. 8. C. P. Brooks: Report on the European textile schools, p. 269-293. 10. W. E. DeRiemer: Education in India, p. 339-354. 11. A. D. Mayo: The organization and reconstruction of state systems of common school education in the North Atlantic states from 1830 to 1865, p. 355-486. 13. B. A. Hinsdale: Notes on the history of foreign influence upon education in the United States, p. 591-629. 16. Anna T. Smith: Education in France, p. 693-788. 17. J. M. Greenwood: Notes on the history of American text-books on arithmetic, p. 789-868. 18. E. S. Holden: The teaching of astronomy in the primary and secondary schools and in the university, p. 869-892. 22. F. F. Hilder: Education in the Argentine Republic, Uruguay, and Brazil, p. 1205-1233. 23. Dental education in the United States, p. 1235-1254. 24. Educational directory, p. 1255-1280. 27. University types and ideals, p. 1435-1460. 28. State supervision of degree-conferring institutions, p. 1461-1476. 29. Report on school statistics, made by a committee of the Department of superintendence of the National educational association (W. T. Harris, chairman) p. 1477-1488. 39. Foreign universities and other institutions of higher education, p. 1741-1751. 41. Sheldon Jackson: Eighth annual report of the introduction of domestic reindeer into Alaska, p. 1773-1796. 42. Institutions for higher education, p. 1797-1901. 44. Wellford Addis: Agricultural and mechanical colleges, p. 1969-1990. 45. Statistics of normal schools, p. 1991-2041. 46. Statistics of secondary schools, p. 2043-2336. 47. City school systems, p. 2337-2418. 48. Manual and industrial training, p. 2419-2440. 49. Commercial education in the United States, p. 2441-2477. 50. Education of the colored race, p. 2479-2507. 51. Schools for the defective classes, p. 2509-2527. 52. Reform schools, p. 2529-2535. 53. Public and private kindergartens, p. 2537-2579. 54. Necrology of 1897, p. 2581-2611. 55. Statistics of elementary education in foreign countries, p. 2613-2619.

[Chapter 11 deals with an important historical topic; chapter 13 traces English, French, and German influence on American education.]

260. 1898-99. (Harris) Washington, 1900. V. 1, xcii, 1248 p.
261. Same. V. 2, viii, 1249-2518 p.

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- 237-257. 6. R. E. Lewis: State education in Japan, p. 259-302. 7. Classification and promotion of pupils (pub. no. 268, 355)—W. T. Harris: The development of the short-interval system in St. Louis, p. 303-330. W. J. Shearer: The Elizabeth plan of grading, p. 330-335. F. J. Barnard: The Seattle plan of promotion and classification, p. 335-341. J. H. Van Sickle: Plan of the north-side schools of Denver, p. 341-346. Francis Cogswell: Promotions in the grammar schools of Cambridge, Mass., p. 346-356. 8. A. D. Mayo: The development of the common school in the Western States from 1830 to 1865, p. 357-450. 9. John Eaton: The Royal normal college for the blind, London, together with incidents in the life of its founder and president, Dr. F. J. Campbell, a native of Tennessee, U. S. A., p. 451-470. *10. W. O. Krohn: Minor mental abnormalities in children as occasioned by certain erroneous school methods, p. 471-478. *11. Miscellaneous educational topics, p. 479-685. *12. W. T. Harris: The study of art and literature in schools, p. 687-706. 13. B. A. Hinsdale and Mary L. Hinsdale: The Western literary institute and college of professional teachers, p. 707-745. 14. E. S. Holden: The United States naval academy at Annapolis; its organization and methods of training, p. 747-780. 15. J. M. Greenwood and Artemas Martin: Notes on the history of American text-books on arithmetic, Part II, p. 781-837 (Parts I-II, pub. no. 271). 16. Alexander Oldrini: Public education in Italy and its reform, 1895-1899, p. 839-870. 17. J. S. Eaton: Educational training for railway service, p. 871-955 (pub. no. 270). 18. H. B. Adams: University extension in Great Britain, p. 957-1055. 19. W. T. Harris: Bird's-eye view of the St. Louis public school system in 1880, p. 1057-1066. *20. E. Gang: School gardens, p. 1067-1084. 21. Education in France, p. 1085-1138. 22. S. B. Weeks: Confederate text-books, 1861-1865, p. 1139-1155. 23. List of educational periodicals in the United States, p. 1157-1160. 24. Educational directory, p. 1161-1187. *25. Applied (or economic) geography, p. 1189-1208. *26. Theodore Hough: A review of Swedish gymnastics, p. 1209-1226. *27. A. D. Mayo: The future of the colored race, p. 1227-1248.
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[In educational history, chapters 8 and 48 should be noted as available separately.]

275. 1899-1900. (Harris) Washington, 1901. V. 1, lxxx, 1280 p.

276. Same. V. 2, vii, 1281-2648 p.

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[Chapter 2, The development of English secondary schools for boys, is in two parts—1, From the fourteenth to the nineteenth century; 2, The century of reform. Chapter 3, Truant schools, is both historical and descriptive. Chapter 8, Papers of the Department of superintendence, 1900, contains: N. M. Butler, Status of education at the close of the century; Aaron Gove, The trail of the city superintendent; E. A. Alderman, Obligations and opportunities of scholarship; W. O. Atwater, Alcohol physiology and superintendence. The section of education at the Paris exposition of 1900 is described in chapter 30.]

287. 1900-1901 (Harris) Washington, 1902. V. 1, cxii, 1216 p.

288. Same. V. 2, vii, 1217-2512 p.

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Volume 2. *28. Coeducation of the sexes in the United States, p. 1217-1315. *29. F. W. Atkinson: The present educational movement in the Philippine Islands, p. 1317-1440. 30. Foreign universities and other foreign institutions of higher education, p. 1441-1457. 31. Sheldon Jackson: Report on education in Alaska, p. 1459-1480. 32. Sheldon Jackson: Eleventh annual report on the introduction of domestic reindeer into Alaska, p. 1481-1498. 33. Consular reports, p. 1499-1525. 34. City school systems, p. 1527-1610. *35. Universities, colleges and technological schools, p. 1611-1730. *36. Statistics of professional and allied schools, p. 1731-1800. 37. Agricultural and mechanical colleges, p. 1801-1841. 38. Statistics of normal schools, p. 1843-1901. 39. Statistics of secondary schools, p. 1903-2230 (pub. no. 299). 40. Manual and industrial training, p. 2231-2268. 41. Commercial and business schools, p. 2269-2297. 42. Education of the colored race, p. 2299-2331. 43. Statistics of

reform schools, p. 2333-2349. 44. Schools for the defective classes, p. 2351-2376. *45. Instruction in mining engineering, p. 2377-2394. *46. Current topics, p. 2395-2415. *47. Miscellaneous educational topics, p. 2417-2486.

[Chapter 2 is of special interest to teachers in Ohio. The following addresses, delivered at the tenth annual meeting of the Southern educational association, December, 1900, are contained in chapter 13: G. T. Winston, Industrial education and the New South; C. W. Dabney, Education and production; R. B. Barringer, Negro education in the South—Julius Dreher, Reply; H. B. Frissell, Discussion—P. B. Barringer, Reply. Chapters 13 and 20 are of interest to Southern educators.]

329. 1902 (Harris) Washington, 1903. V. 1, cxii, 1176 p.

330. Same. V. 2, vii, 1177-2447 p.

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[Especially important chapters of the Report for 1902, still offered as separates, are 2, 4, 10, 11, 22, and 23.]

* Not separately available.

341. 1903 (Harris) Washington, 1905. V. 1, cxii, 1216 p.

342. Same. V. 2, viii, 1217-2512 p.

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[Chapter 5 sketches the history of American universities and discusses their functions, while an important portion of Southern educational history is presented in chapter 9. The treatment of the kindergarten in chapter 16 is both historical and descriptive. Chapter 29 contains interesting and useful biographical material.]

356. 1904 (Harris) Washington, 1906. V. 1, civ, 1176 p.

357. Same, V. 2, viii, 1177-2480 p.

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zation, p. 1129-1133. (b) Art education the true industrial education, p. 1133-1139. (c) The intellectual value of tool work, p. 1139-1144. 19. List of educational periodicals in the United States in 1904, p. 1145-1148. 20. Educational directory, p. 1149-1176.

Volume 2. 21. Education at the St. Louis exposition—Universities and colleges of the United States, p. 1177-1209. *22. Education at the St. Louis exposition—Foreign countries, p. 1211-1275. 23. Length of teachers' service, p. 1277-1301. 24. Statistics of city school-systems, p. 1303-1415. 25. Universities, colleges, and technological schools, p. 1417-1543 (reprinted 1906, pub. no. 358). 26. Agricultural and mechanical colleges, p. 1545-1586. *27. Professional education, p. 1587-1665. 28. Statistics of normal schools, p. 1667-1725, 29. Statistics of secondary schools, p. 1727-2055 (pub. no. 359). 30. Manual and industrial training, p. 2057-2108. 31. Commercial and business schools, p. 2109-2145. 32. Schools for nurses, p. 2147-2173. 33. Schools for the colored race, p. 2175-2207. 34. Statistics of reform schools, p. 2209-2225. 35. Schools for the defective classes, p. 2227-2256. 36. Sheldon Jackson: Report on education in Alaska, p. 2257-2268. *37. Current topics, p. 2269-2371. 38. Foreign universities and other foreign institutions of higher education in 1904, p. 2373-2419. 39. Miscellaneous educational topics, 2421-2452.

[Chapter 2, 1904, presents and discusses measurements of school children, taken chiefly in Worcester, Massachusetts. The extensive display made by American schools, colleges, and universities at the St. Louis exposition is described in chapters 14, 15, and 21. Chapter 23 is on Length of teachers' service: results of a special inquiry into the conditions existing in 398 cities and towns of 8,000 inhabitants and over. A series of four articles by Professor Foster Watson, of University college, Aberystwyth, Wales, entitled Notices of some early English writers on education, extends from chapter 17, 1901, through chapters 10, 1902, and 6, 1903, to its conclusion in chapter 8, Report for 1904. Material on Temperance instruction may be found in chapter 7, 1904, also in chapters 9, 1900; 21, 1901, and 6, 1902.]

365. 1905. (Brown) Washington, 1907. V. 1, li, 655 p.

366. Same. V. 2, iv, 657-1400 p.

CONTENTS. Volume 1. The Commissioner's introduction, p. vii-li. Chapters: 1. W. T. Harris: The reports of the Mosely educational commission, p. 1-10. 2. Extracts from the report of the Mosely educational commission to the United States of America, October-December, 1903, p. 11-39. 3. Statement of proceedings instituted to execute the Rhodes scholarship trust, p. 41-55. 4. Education in France, p. 57-86. *5. The teaching of agriculture in the schools of France and Belgium, p. 87-96. 6. J. Jastrow: Higher education for business men in the United States and Germany, p. 97-110. 7. G. W. Ellis: Education in Liberia, p. 111-129. 8. C. M. Gayley: An account of the proceedings of the International congress for the reproduction of manuscripts, Liège, August 21-23, 1905, p. 131-142. 9. A. S. Draper: The New York secondary school system, p. 143-154. 10. H. C. Ives: Art education an important factor in industrial development, p. 155-183. *11. Current topics, p. 185-235. 12. Miscellaneous educational topics, p. 237-266. 13. Sheldon Jackson: Report on education in Alaska, p. 267-282. 14. Sheldon Jackson: Reindeer in Alaska, 1905, p. 283-291. 15. S. M. Lindsay: Inauguration of the American school system in Porto Rico, p. 293-344. 16. Education in the Philippine Islands, p. 345-364. 17. Educational directory, p. 365-396. 18. Statistics of state school systems, p. 397-427. 19. Statistics of city school systems, p. 429-535. 20. Universities, colleges, and technological schools, p. 537-655.

Volume 2. 21. Agricultural and mechanical colleges, p. 657-708. 22. Professional schools, p. 709-754 (pub. no. 371). 23. Statistics of normal schools, p. 755-811. 24. Statistics of secondary schools, p. 813-1163. 25. Manual and industrial training, p. 1165-1217. 26. Commercial and business schools, p. 1219-1255. 27. Schools for nurses, p. 1257-1292 (pub. no. 370). 28. Schools for the colored race, p. 1293-1327. 29. Statistics of reform schools, p. 1329-1345. 30. Schools for the defective classes, p. 1347-1379.

[Extracts from the report of the Mosely educational commission, and an outline of its work, are given in chapters 1 and 2. Chapter 9, by A. S. Draper, on The New York secondary school system, deserves attention; also chapter 15, Inauguration of the American school system in Porto Rico.]

374. 1906. (Brown) Washington, 1907-08. V. 1, xlvii, 643 p. (not available as volume).

375. Same. V. 2, iv, 645-1308 p. (not available as volume).

The following separates are available: The Commissioner's introduction, p. vii-xxxvi. Publications of the U. S. Bureau of education, 1867-1906, p. xxxvii-xlvii (pub. no. 372). Chapters: 1. Education in Great Britain and Ireland, 1904-1906, p. 1-17. 2. Education in France, p. 19-34. 3. The new Prussian school law of 1906, p. 35-72. 4. W. S. Monroe: Progress of education in Italy, p. 73-90. 5. Foreign universities and other foreign institutions of higher education in 1905, p. 91-122. 6. Public education in British India, p. 123-140. 7. Edu-

education in the Philippines and in Cuba, p. 141-153. 8. M. Adelaide Nutting: The education and professional position of nurses, p. 155-205. 9. Current topics, p. 207-235. 10. Sheldon Jackson: Report on education in Alaska and the introduction of reindeer, p. 237-255. 11. Educational periodicals, p. 257-261. 12. Educational directory, p. 263-292. 13. Statistics of state school systems, p. 293-323. 14. Statistics of city school systems, p. 325-444. 16. Agricultural and mechanical colleges, p. 565-592. 17. Professional schools, p. 593-643. 18. Statistics of normal schools, p. 645-693. 19. Statistics of secondary schools, p. 695-1041 (pub. no. 400). 20. Manual and industrial training, p. 1043-1094. 21. Commercial and business schools, p. 1095-1124. 23. Schools for the colored race, p. 1149-1173. 24. Statistics of reform schools, p. 1175-1192. 25. Schools for the defective classes, p. 1193-1227. 26. Legislation relating to education enacted by the Fifty-ninth Congress, 1905-1907, p. 1229-1255. 27. Summer colonies for city people, p. 1257-1262.

383. 1907. (Brown) Washington, 1908. V. 1, vii, 522 p. (not available as volume).
 384. Same. V. 2, vii, 523-1214 p.

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[Chapters 9 and 13 are worthy of special mention for purposes of distribution.]

391. 1908. (Brown) Washington, 1908. V. 1, vi, 382 p. (not available as volume).
 392. Same. V. 2, vii, 383-1090 p. (not available as volume).

The following separates are available: The Commissioner's introduction, p. 1-31 (Statistical summary, p. 27-31). Chapters: 2. Recent educational legislation, p. 109-133. 3. Education in Porto Rico, p. 135-137. 4. Education in the Philippines, p. 139-144. 5. The modern aspect of higher education in Spanish-American countries, p. 145-173. 6. Education in Great Britain and Ireland, 1907-8, p. 175-221. 7. Education in France, p. 223-245. 8. Education in Central Europe, p. 247-281. 9. Current topics—foreign, p. 283-304. 10. Foreign universities and other foreign institutions of higher education in 1907, p. 305-341. 11. Educational directory, p. 343-382. 12. Statistics of state common school systems, 1906-7, p. 383-407. 13. Statistics of city school systems, p. 409-611. 14. Universities, colleges, and technological schools, p. 613-735. 15. Agricultural and mechanical colleges, p. 737-769. 16. Professional schools, p. 771-815 (reprinted 1909, pub. no. 401). 17. Normal schools, p. 817-857. 18. Secondary schools, p. 859-891. 19. Manual and industrial training, p. 893-927. 20. Commercial and business schools, p. 929-938. 22. Schools for the colored race, p. 941-955. 23. Reform schools, p. 957-975. 24. Schools for the defective classes, p. 977-1013. 25. Foreign elementary education, p. 1015-1021. 27. G. D. Strayer: Summary of the statistical tables, p. 1057-1075.

411. 1909. (Brown) Washington, 1909. V. 1, xi, 598 p. (not available as volume).
 412. Same. V. 2, v, 599-1373 p. (not available as volume).

The following separates are available: The Commissioner's introduction, p. 1-32, including List of references on moral education, p. 30-32 (pub. no. 414). Chapters: 3. C. S. Foos: State educational associations, p. 251-274 (pub. no. 421). 7. L. S. Rowe: Educational progress in the Argentine Republic and Chile, p. 323-349; Appendixes, p. 350-362, including C. O. Bunge: Historical sketch of education in the Argentine Republic, p. 350-357 (pub. no. 416). 11. Evelyn M. Goldsmith: Schools for crippled children abroad, p. 503-511 (pub. no. 417).

12. John Fryer: The educational reform in China, p. 513-521 (pub. no. 418). 15. Educational directory, p. 557-598 (pub. no. 419). 16. Statistics of state common-school systems, p. 599-622 (pub. no. 424). 17. Statistics of city school systems, p. 623-858 (pub. no. 425). 18. Universities, colleges, and technological schools, p. 859-991 (pub. no. 426). 19. Agricultural and mechanical colleges, p. 993-1027 (pub. no. 427). 20. Professional schools, p. 1029-1078 (pub. no. 428). 21. Normal schools, p. 1079-1119 (pub. no. 429). 22. Secondary schools, p. 1121-1160 (pub. no. 430). 23. Manual and industrial training, p. 1161-1201 (pub. no. 431). 25. Schools for the colored race, p. 1213-1227 (pub. no. 432). 26. Reform schools, p. 1229-1249 (pub. no. 433). 27. Schools for the blind and deaf, p. 1251-1277 (pub. no. 434). 28. Schools for the feeble-minded, p. 1279-1285 (pub. no. 435).

442. 1910. (Brown) Washington, 1910. V. 1, viii, 662 p.

443. Same. V. 2, xxvi, 663-1373 p.

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Circulars, 1888, etc., two volumes—Continued.

100. no. 4. Education in Georgia, by Charles Edgeworth Jones. Washington, 1889. 154 p. illus. (Contributions to American educational history, no. 5.)
101. no. 5. Industrial education in the South, by A. D. Mayo. Washington, 1888. 86 p. illus.
102. no. 6. Proceedings of the Department of superintendence of the National educational association at its meeting in Washington, February 14-16, 1888. Washington, 1888. 165 p.
103. no. 7. History of education in Florida, by George Gary Bush. Washington, 1889. 54 p. illus. (Contributions to American educational history, no. 6.)

A collection of special interest to Southern educators. Circulars nos. 2 and 5, 1888, are not available as separates.

IV. PUBLICATIONS ON SPECIAL SUBJECTS.

[For additional material on these and other special topics, consult the index to this Bulletin.]

1. AGRICULTURAL AND MECHANICAL COLLEGES.

348. General laws relating to agricultural and mechanical land grant colleges. Reprint of chapter 1, p. 1-90, Report for 1902, and chapter 2, p. 39-226, Report for 1903.

Acts of Congress and state laws of Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming.

2. AGRICULTURAL EDUCATION.

380. On the training of persons to teach agriculture in the public schools, by Liberty Hyde Bailey. Washington, 1908. 53 p. (Bulletin, 1908, no. 1).

CONTENTS: I. The nature of the problem.—II. The means of training the teachers.—III. The general outlook; the significance of normal work in the colleges of agriculture.—IV. List of references.

447. Opportunities for graduate study in agriculture in the United States, by A. C. Monahan. Washington, 1911. 16 p. (Bulletin, 1911, no. 2.)

3. ALASKA SCHOOL AND REINDEER SERVICE.

214. Education in Alaska. Reprint of chapter 28, p. 873-892, Report for 1891-92.
220. Educational affairs in Alaska. Reprint of chapter 9, p. 1705-1748, Report for 1892-93, part III.
236. Education in Alaska. Reprint of chapter 34, p. 1435-1468, Report for 1895-96.
279. Education and reindeer in Alaska, 1899-1900. Reprint of chapters 32-33, p. 1733-1785 (plates), Report for 1899-1900.
291. Education and reindeer in Alaska, 1901. Reprint of chapters 31-32, p. 1459-1498 (plates), Report for 1900-1901.
346. Education and reindeer in Alaska, 1903. Reprint of chapters 44 and 45, p. 2333-2384, Report for 1903.
448. Education of the natives of Alaska and the reindeer service. Reprint of chapter 33, Report for 1910, with an appendix. Washington, 1911. 1343-1370, lxii p. map.
458. Rules and regulations regarding the Alaska school service for the natives of Alaska, adopted May 20, 1911. Washington, 1911. 32 p.

4. AMERICAN EDUCATIONAL HISTORY.

a. Series of Contributions.

Contributions to American educational history, ed. by Herbert B. Adams. Volumes 1 and 2 (bound with collective title-pages).

A collection of special interest to Southern educators.

CONTENTS: Volume 1.—1. H. B. Adams: The College of William and Mary.—2. H. B. Adams: Thomas Jefferson and the University of Virginia.—3. C. L. Smith: History of education in North Carolina. (Circulars of information, 1887, no. 1, and 1888, nos. 1 and 2.)

Volume 2.—4. Colyer Meriwether: History of higher education in South Carolina, with a sketch of the free school system.—5. C. E. Jones: Education in Georgia.—6. G. G. Bush: History of education in Florida.—7. W. F. Allen and D. E. Spencer: Higher education in Wisconsin. (Circulars of information, 1888, nos. 3, 4, 7; 1889, no. 1.)

94. The College of William and Mary, a contribution to the history of higher education, with suggestions for its national promotion; by Herbert B. Adams. Washington, 1887. 89 p. illus. (Contributions to American educational history, no. 1—Circulars of information, 1887, no. 1.)
97. Thomas Jefferson and the University of Virginia, by Herbert B. Adams, with authorized sketches of Hampden-Sidney, Randolph-Macon, Emory-Henry, Roanoke, and Richmond colleges, Washington and Lee university, and Virginia military institute. Washington, 1888. 308 p. illus. (Contributions to American educational history, no. 2—Circulars of information, 1888, no. 1.)
99. History of higher education in South Carolina, with a sketch of the free school system, by Colyer Meriwether. Washington, 1889. 247 p. illus. (Contributions to American educational history, no. 4—Circulars of information, 1888, no. 3.)
100. Education in Georgia, by Charles Edgeworth Jones. Washington, 1899. 154 p. illus. (Contributions to American educational history, no. 5—Circulars of information, 1888, no. 4.)
103. History of education in Florida, by George Gary Bush. Washington, 1889. 54 p. illus. (Contributions to American educational history, no. 6—Circulars of information, 1888, no. 7.)
157. Higher education in Wisconsin, by William F. Allen and David E. Spencer. Washington, 1889. 68 p. illus. (Contributions to American educational history, no. 7—Circulars of information, 1889, no. 1.)
170. Higher education in Indiana, by James Albert Woodburn. Washington, 1891. 200 p. illus. (Contributions to American educational history, no. 10—Circulars of information, 1891, no. 1.)
174. History of higher education in Michigan, by Andrew C. McLaughlin. Washington, 1891. 179 p. illus. (Contributions to American educational history, no. 11—Circulars of information, 1891, no. 4.)
175. The history of higher education in Ohio, by George W. Knight and John R. Commons. Washington, 1891. 258 p. illus. (Contributions to American educational history, no. 12—Circulars of information, 1891, no. 5.)
193. The history of education in Connecticut, by Bernard C. Steiner. Washington, 1893. 300 p. illus. (Contributions to American educational history, no. 14—Circulars of information, 1893, no. 2.)
194. The history of education in Delaware, by Lyman P. Powell. Washington, 1893. 186 p. illus. (Contributions to American educational history, no. 15—Circulars of information, 1893, no. 3.)
196. Higher education in Tennessee, by Lucius Salisbury Merriam. Washington, 1893. 287 p. illus. (Contributions to American educational history, no. 16—Circulars of information, 1893, no. 5.)

197. Higher education in Iowa, by Leonard F. Parker. Washington, 1893. 190 p. illus. (Contributions to American educational history, no. 17—Circulars of information, 1893, no. 6.)
209. History of higher education in Rhode Island, by William Howe Tolman. Washington, 1894. 210 p. illus. (Contributions to American educational history, no. 18—Circulars of information, 1894, no. 1.)
210. History of education in Maryland, by Bernard C. Steiner. Washington, 1894. 331 p. illus. (Contributions to American educational history, no. 19—Circulars of information, 1894, no. 2.)
243. Higher education in Missouri, by Marshall S. Snow. Washington, 1898. 164 p. (Contributions to American educational history, no. 21—Circulars of information, 1898, no. 2.)
244. History of education in New Hampshire, by George Gary Bush. Washington, 1898. 170 p. (Contributions to American educational history, no. 22—Circulars of information, 1898, no. 3.)
252. History of education in New Jersey, by David Murray. Washington, 1899. 344 p. illus. (Contributions to American educational history, no. 23—Circulars of information, 1899, no. 1.)
256. History of higher education in Kentucky, by Alvin Fayette Lewis. Washington, 1899. 350 p. illus. (Contributions to American educational history, no. 25—Circulars of information, 1899, no. 3.)
264. The University of the State of New York: history of higher education in the State of New York, by Sidney Sherwood. Washington, 1900. 538 p. illus. (Contributions to American educational history, no. 28—Circulars of information, 1900, no. 3.)
292. History of higher education in Colorado, by James Edward Le Rossignol. Washington, 1903. 67 p. illus. (Contributions to American educational history, no. 34—Circulars of information, 1903, no. 1.)
294. History of higher education in Maine, by Edward W. Hall. Washington, 1903. 241 p. illus. (Contributions to American educational history, no. 36—Circulars of information, 1903, no. 3.)

b. Miscellaneous.

56. American education as described by the French commission to the International exhibition of 1876, [by Ferdinand Buisson and others]. Washington, 1879. 37 p. (Circulars of information, 1879, no. 5.)
140. Statistics regarding national aid to education. Washington, 1885. 3 p.
Contains tables in which the whole amount proposed for distribution by the Blair bill (\$77,000,000) is apportioned to every state and organized territory according to the total illiterate population, the minor illiterate population, the total constitutional population, and the wealth of each, as reported by the Tenth census.
146. Historical sketch of Mount Holyoke seminary, by Mary O. Nutting. Washington, 1876. 24 p.
206. Education in southwestern Virginia, by A. D. Mayo. Reprint of chapter 24, p. 881-921, Report for 1890-91.
271. Notes on the history of American text-books on arithmetic, by J. M. Greenwood and Artemas Martin. Reprint of chapter 17, p. 789-868, Report for 1897-98, and chapter 15, p. 781-837, Report for 1898-99.

5. ASSOCIATIONS AND CONGRESSES.

66. Proceedings of the Department of superintendence of the National educational association at its meeting at New York, February 8-10, 1881. Washington, 1881. 79 p. (Circulars of information, 1881, no. 3.)
Contains: Andrew McMillan: Uniformity of school statistics.—J. P. Wickersham: Weak places in our systems of public instruction.—C. O. Thompson: The conservation of pedagogic energy.—F. B. Hough: Our schools and our forests.—John Eaton: Museums illustrative of education.—J. W. Patterson: Education and the state.

71. Proceedings of the Department of superintendence of the National educational association at its meeting at Washington, March 21-23, 1882. Washington, 1882. 111 p. (Circulars of information, 1882, no. 2.)

Contains: J. S. Billings: Information necessary to determine the merits of the heating and ventilation of a school building.—H. S. Jones: Obstacles in the way of better primary education.—G. Stanley Hall: Chairs of pedagogy in our higher institutions of learning.—A. D. Mayo: Remarks on national aid to education.—D. A. Hawkins: National aid to education from a northern standpoint.—J. L. M. Curry: Remarks on national aid to education.—Sheldon Jackson: Education in Alaska.—J. M. Gregory: Some fundamental inquiries concerning the common school studies.—W. T. Harris: How to improve the qualifications of teachers.

93. Proceedings of the Department of superintendence of the National educational association at its meeting at Washington, February 23-26, 1886. Washington, 1886. 169 p. (Circulars of information, 1886, no. 2.)

Contains: M. A. Newell: School superintendence a profession.—D. L. Kiehle: Duties of county superintendents.—C. S. Young: Co-education of the races.—J. A. B. Lovett: National aid to education.—S. M. Finger: Educational and religious interests of the colored people in the South.—Warren Higley: Forestry in education.—N. C. Dougherty: Language work.—H. M. Skinner: Growth and benefits of reading circles.—J. W. Akers: City superintendents.

102. Proceedings of the Department of superintendence of the National educational association at its meeting in Washington, February 14-16, 1888. Washington, 1888. 165 p. (Circulars of information, 1888, no. 6.)

Contains: C. H. Ham: How and to what extent can manual training be ingrafted on our system of public schools?—J. B. Thayer: Purpose of county institutes, and how best secured.—Martha Fleming: Elocution: its place in education.—A. S. Draper: How shall the qualifications of teachers be determined?—J. P. Wickersham: Are existing state normal schools adequate to accomplish their work?—W. T. Harris: Moral education in the common schools.—C. W. Eliot: Can school programmes be shortened and enriched?—N. H. R. Dawson: Alaska.—J. E. Bradley: The superintendent and the teacher.—A. E. Winship: Relation of the superintendent and teacher to the school.—J. A. B. Lovett, A. P. Marble, and Alexander Hogg: National aid to education. (Discussion follows individual topics.)

129. National pedagogic congress of Spain. Washington, 1882. 4 p.

An account of the congress held in Madrid in May, 1882, under the presidency of the King, with his address.

421. State educational associations, by C. S. Foos. Reprint of chapter 3, p. 251-274, Report for 1909.

- Reports on international congresses by American delegates. Advance sheets of chapter 16, p. 579-601, of Report for 1910.

1. Report of the third International congress on home education, Brussels, August 21-25, 1910, by W. S. Monroe. 2. Report of the third International congress on school hygiene, Paris, August 2-7, 1910, by T. F. Harrington. 3. Report of the third International congress on the physical education of the young, Brussels, August 10-13, 1910.

6. BARNARD'S AMERICAN JOURNAL OF EDUCATION.

187. Analytical index to Barnard's American journal of education. 31 v., 1855-1881. Washington, 1892. 128 p.

Every owner and user of a set of "that monumental cyclopedia of pedagogical literature," Barnard's American journal, will find this index very useful.

7. BIBLIOGRAPHY OF EDUCATION.

386. Bibliography of education for 1907, compiled by James Ingersoll Wyer, *jr.*, and Martha L. Phelps. Washington, 1908. 65 p. (Bulletin, 1908, no. 3.)
408. A teacher's professional library: classified list of one hundred titles. Washington, 1909. 14 p. (Bulletin, 1909, no. 8.)
410. Bibliography of education for 1908-9. Washington, 1909. 134 p. (Bulletin, 1909, no. 9.)

446. Bibliography of science teaching, compiled by a committee of the American federation of teachers of the mathematical and the natural sciences. Washington, 1911. 27 p. (Bulletin, 1911, no. 1.)
456. Bibliography of education for 1909-10. Washington, 1911. 166 p. (Bulletin, 1911, no. 10.)
457. Bibliography of child study for the years 1908-1909, by Louis N. Wilson. Washington, 1911. 84 p. (Bulletin, 1911, no. 11.)

8. BUREAU OF EDUCATION: PUBLICATIONS AND WORK.

308. An address on the needs of the Bureau of Education, by Hon. John Eaton, United States Commissioner of Education. Delivered before the Department of superintendence of the National education association, at the meeting of 1879. Washington, 1879. 7 p. (Reprinted from Circular of information, no. 2, 1879.)
372. Publications of the United States Bureau of Education, 1867-1906. Reprint from Report for 1906. Washington, 1907. xxxvii-xxlvii p.
385. List of publications of the United States Bureau of Education, 1867-1907. Washington, 1908. 69 p. (Bulletin, 1908, no. 2.)
407. Index to the reports of the Commissioner of Education, 1867-1907. Washington, 1909. 103 p. (Bulletin, 1909, no. 7.)
439. List of publications of the United States Bureau of Education, 1867-1910. Washington, 1910. 55 p. (Bulletin, 1910, no. 3.)

9. DEFECTIVES: EDUCATION.

376. The auxiliary schools of Germany; six lectures, by B. Maennel. Tr. by Fletcher Bascom Dresslar. Washington, 1907. 137 p. (Bulletin, 1907, no. 3.)

CONTENTS: I. Historical sketch.—II. Reasons for the establishment of auxiliary schools.—III. Admission procedure.—IV. The parents and the whole environment of auxiliary school pupils before and during the school period.—V. Health conditions of auxiliary school pupils.—VI. The pupils of the auxiliary school and their characterization.—VII. The building for the auxiliary school.—VIII. Classification of pupils in an auxiliary school, and the number in each class.—IX. The daily programme.—X. The curriculum.—XI. Methods of instruction.—XII. Discipline in the auxiliary school.—XIII. Preparation of auxiliary school pupils for confirmation.—XIV. The community and the State in their relations to the auxiliary school.—XV. The teachers and the principal of the auxiliary school.—XVI. The pedagogical significance of the auxiliary school.—XVII. Appendix.—XVIII. Bibliography.

417. Schools for crippled children abroad, by Evelyn M. Goldsmith. Reprint of chapter 11, p. 503-511, Report for 1909.

10. EDUCATION AND CRIME.

171. The fourth International prison congress, St. Petersburg, Russia, by C. D. Randall. Washington, 1891. 253 p. illus. (Circulars of information, 1891, no. 2.)

Contains as introduction a summary of the three previous congresses. See also The fifth International prison congress, Report for 1895-96, chapter 13, p. 669-700.

274. Education and crime. Reprint of chapter 28, p. 1249-1343, Report for 1899.

CONTENTS: Horace Mann: The power of common schools to redeem the state from social vices and crimes.—E. D. Mansfield: The relation between crime and education.—Richard Grant White: The public-school failure.—B. F. Tweed: Reply to Richard Grant White.—W. T. Harris: Compulsory education in relation to crime and social morals.—Benjamin Reece: Public schools as affecting vice and crime.—D. C. Torrey: Is crime increasing in Massachusetts?—A. W. Gould: Education and crime.—W. T. Harris: School statistics and morals.—Rebecca Harding Davis: The curse in education.—W. T. Harris: Erroneous interpretation of prison statistics; Influence of the schools in France.—Statistics.

11. EDUCATIONAL EXHIBITIONS.

47. Schedule for the preparation of students' work for the Centennial exhibition, as reported by the committee of the Department of superintendence of the National educational association, appointed at Minneapolis in 1875. Washington, 1875. 15 p. (Circulars of information, 1875, no. 8.)
84. Suggestions respecting the educational exhibit at the World's industrial and cotton centennial exposition. Washington, 1884. 28 p. (Circulars of information, 1884, no. 5.)
223. Education at the World's Columbian exposition, including reports and comments by American and foreign educators and delegates. Reprint of chapters 1-8, Report for 1892-93, part II. Washington, 1896. 423-690 p.
- CONTENTS: 1. Programme of the International congress of education and addresses of welcome. 2. American views and comments on the educational exhibits. 3. German criticism on American education and the educational exhibits. 4. Views of the French commissioners. 5. Medical education in the United States, as presented by French specialists. 6. Notes and observations made by the Italian, Swedish, Danish, and Russian delegates. 7. Report on American technological schools. 8. Higher education of women in Russia.
225. Notes on education at the Columbian exposition, by Hon. John Eaton. Reprint of chapter 10, Report for 1892-93, part II. Washington, 1896. 1015-1224 p.

12. EDUCATIONAL VALUES.

250. Educational values, by W. T. Harris. Reprint of chapter 15, Report for 1893-94, part 1. Washington, 1904. 617-638 p.

A discussion of the educative value of the several studies in elementary and secondary schools, and in colleges and universities.

13. FOREIGN SCHOOL SYSTEMS.

33. Schools in British India, [by Joseph Warren]. Washington, 1873. 30 p. (Circulars of information, 1873, no. 2.)
41. Education in Japan. Washington, 1875. 64 p. (Circulars of information, 1875, no. 2.)
51. Elementary education in London, [with address of Sir Charles Reed]. Washington, 1878. 24 p. (Circulars of information, 1878, no. 2.)
360. The Education bill of 1906 for England and Wales as it passed the House of Commons, by Anna Tolman Smith. 2d ed. Washington, 1907. 48 p. (Bulletin, 1906, no. 1.)
388. Education in Formosa, by Julean H. Arnold. Washington, 1908. 70 p. (Bulletin, 1908, no. 5.)
- CONTENTS: I. Education under the Dutch (1624-1661).—II. Education under the Chinese (1661-1683 and 1683-1895).—III. Education under the Japanese (from 1895).—IV. Appendix: Missionary schools.
416. Educational progress in the Argentine Republic and Chile, by L. S. Rowe. Reprint of chapter 7, p. 323-362, Report for 1909.
418. Educational reform in China, by John Fryer. Reprint of chapter 12, p. 513-521, Report for 1909.
423. The movement for reform in the teaching of religion in the public schools of Saxony, by Arley Barthlow Show. Washington, 1910. 45 p. (Bulletin, 1910, no. 1.)

CONTENTS: I. Rise and progress of the controversy.—II. The questions at issue.

14. HIGHER EDUCATION.

[See also Research, Universities and colleges.]

95. The study of history in American colleges and universities, by Herbert B. Adams. Washington, 1887. 299 p. illus. (Circulars of information, 1887, no. 2.)
Treats the subject from a historical point of view, and forms a substantial contribution to the history of higher education in the United States.
179. Biological teaching in the colleges of the United States, by John P. Campbell. Washington, 1891. 183 p. (Circulars of information, 1891, no. 9.)
Designed to be of value to all teachers of science, whether in colleges or secondary schools.
297. Length of the college course. Reprint of chapter 23, p. 927-948, Report for 1902.
Action taken by certain institutions toward reducing the time requirements for the bachelor's degree, especially with reference to professional courses, together with a reprint of some of the discussions and a comparative statement showing the advance in admission requirements at Harvard university from 1642 to the present time.
399. Admission of Chinese students to American colleges, by John Fryer. Washington, 1909. 221 p. (Bulletin, 1909, no. 2.)
CONTENTS: I. The American college system.—II. College entrance requirements.—III. Expenses.—IV. The organization of Chinese students in the United States.—V. Suggestions and advice.—VI. Tables of universities and colleges, showing provision for Chinese students.—VII. References.

15. INDIAN SCHOOLS.

114. The Indian school at Carlisle Barracks, by Charles Warren. Washington, 1880. 5 p.
An interesting report of a visit to this school during the first year of its existence.

16. INDUSTRIAL AND TECHNICAL EDUCATION.

89. A review of the reports of the British royal commissioners on technical instruction, with notes, by Charles O. Thompson. Washington, 1885. 55 p. (Circulars of information, 1885, no. 3.)
A valuable contribution to the literature of technical instruction in Europe.
216. Art and industry. Education in the industrial and fine arts in the United States, by Isaac Edwards Clarke. Part II. Industrial and manual training in public schools. Washington, 1892. cxlviii, 1338 p.
A historical and descriptive treatment of the subject, unanimously approved by the National education association as follows: "This encyclopedic volume relating to industrial and manual training in public schools, is a storehouse of valuable information concerning those topics, and is a most timely contribution to the movement of the new education."
253. Art and industry. Education in the industrial and fine arts in the United States, by Isaac Edwards Clarke. Part III. Industrial and technical training in voluntary associations and endowed institutions. Washington, 1897. liii, 1145 p.
This volume is largely given to the history of the mechanics institutes and similar associations in the cities of the United States, and also includes accounts of modern institutes founded by individual citizens.
254. Art and industry. Education in the industrial and fine arts in the United States, by Isaac Edwards Clarke. Part IV. Industrial and technical training in schools of technology and in U. S. land grant colleges. Washington, 1898. lvi, 1020 p.
Contains accounts of the typical manual training schools, of five leading technical mechanical schools, of some trade schools, of an educational experiment undertaken by the Baltimore and Ohio railroad in 1885-87, and of the schools of science and engineering of the land grant colleges of agriculture and the mechanic arts.

270. Educational training for railway service, by J. Shirley Eaton. Reprint of chapter 17, p. 871-955, Report for 1899.
353. Manual, industrial, and technical education in the United States, by Calvin M. Woodward. Reprint of chapter 19, p. 1019-1046, Report for 1903. illus.
361. German views of American education, with particular reference to industrial development, collated from the reports of the Royal Prussian industrial commission of 1904, by William N. Hailmann. 2d ed. Washington, 1907. 55 p. (Bulletin, 1906, no. 2.)

CONTENTS: General considerations.—The kindergarten.—Elementary schools.—Middle schools.—Normal instruction.—Drawing and art instruction.—Industrial art schools.—Technical colleges and other advanced technical institutions.—Apprenticeship and trade schools.—Contents of the "Reiseberichte."

389. The apprenticeship system in its relation to industrial education, by Carroll D. Wright. Washington, 1908. 116 p. (Bulletin, 1908, no. 6.)

CONTENTS: I. A combination of apprenticeship and academic education needed.—II. Description of the systems which have developed.—III. Origin of the modern apprenticeship system.—IV. Extent of the apprenticeship system.—V. Statutory regulations relating to apprentices.—VI. The attitude of trade unions to the apprenticeship system and to industrial education.—VII. Types of systems.—VIII. General considerations and conclusions.—IX. List of references relating to the education of apprentices.—X. Appendix: Digest of apprentice laws in the United States.

406. Instruction in the fine and manual arts in the United States: a statistical monograph, by Henry Turner Bailey. Washington, 1909. 184 p. (Bulletin, 1909, no. 6.)

CONTENTS: I. Introduction.—II. The federal government.—III. The States.—IV. Municipalities.—V. Private high schools and academies.—VI. Universities, colleges, and technological schools.—VII. Colleges for women.—VIII. Private art schools, etc.—IX. Summer schools.—X. Art museums and societies.—XI. Publications.—XII. Summary.—XIII. Statistical tables.—XIV. Bibliography.

420. Education for efficiency in railroad service, by J. Shirley Eaton. Washington, 1909. 159 p. (Bulletin, 1909, no. 10.)

CONTENTS: I. Preparation and efficiency.—II. Efficiency and compensation.—III. Education en masse.—IV. Bearing the expense of specialized railroad education.—V. Apprenticeship.—VI. Special apprentices.—VII. The school—its functions and methods.—VIII. Vocational railroad schools.—IX. High schools.—X. The correspondence school.—XI. Higher education for railroad careers.—XII. Schools of railroad engineering and administration.—XIII. Schools of railroad administration.—XIV. Summary.—XV. Appendixes: A. Statistics of railway apprenticeship. B. Educational and welfare work on European railroads.

17. LIBRARIES.

143. Statistics of public libraries in the United States, 1884-85. Reprint of p. ccxxix-ccxxx, 691-782, Report for 1884-85.
148. Public libraries in the United States of America, their history, condition and management. Special report. Part I. ed. by S. R. Warren and S. M. Clark. Part II. Rules for a dictionary catalogue, by C. A. Cutter. Washington, 1876. 2 v.

"A valuable encyclopedia of library science and practice of some 1,200 pages, which is not yet superseded in the English speaking world by any comprehensive treatise, and retains all of its interest and much of its authority."

200. Catalogue of "A. L. A." library; 5,000 volumes for a popular library, selected by the American library association and shown at the World's Columbian exposition. Washington, 1893. 592 p.
232. Public, society, and school libraries in the United States, with library statistics and legislation of the various states. Chapters from Report for 1895-96: chapter 8, Statistics for 1896, by Alexander Summers; chapter 9, Library legislation in the United States, by Henderson Presnell. Washington, 1897. 339-599 p.

278. Public, society, and school libraries. Reprint of chapter 17, Report for 1899-1900. Washington, 1901. 923-1165 p.

CONTENTS: Summaries of statistics of libraries in 1900; libraries of 300 volumes and over in 1875, 1885, and 1896; libraries of 1,000 volumes and over in 1891 and 1896.—Statistics of public, society, and school libraries of 1,000 volumes and over in 1900.

295. Public, society, and school libraries in the United States, with library statistics and legislation of the various states. Reprint of chapter 9, Report for 1895-96, and of chapter 17, Report for 1899-1900. Washington, 1903. 523-599, 923-1165 p.
405. Statistics of public, society, and school libraries having 5,000 volumes and over in 1908. Washington, 1909. 215 p. (Bulletin, 1909, no. 5.)

18. MATHEMATICAL INSTRUCTION.

453. Undergraduate work in mathematics in colleges of liberal arts and universities. International commission on the teaching of mathematics. The American report. Committee no. X. Washington, 1911. 30 p. (Bulletin, 1911, no. 7.)
459. Training of teachers of elementary and secondary mathematics. International commission on the teaching of mathematics. The American report. Committee no. V. Washington, 1911. 23 p. (Bulletin, 1911, no. 12.)

19. MUSEUMS.

154. Outlines for a museum of anatomy, by R. W. Shufeldt. Washington, 1885. 65 p.
309. An address on museums illustrative of education, by Hon. John Eaton, United States Commissioner of Education. Delivered before the Department of superintendence of the National education association at the meeting of 1881. Washington, Government printing office, 1881. 12 p. 8°. (Reprinted from Circular of information, no. 3, 1881.)

20. MUSIC EDUCATION.

387. Music education in the United States: schools and departments of music, by Arthur L. Manchester. Washington, 1908. 85 p. (Bulletin, 1908, no. 4.)

CONTENTS: I. Historical development.—II. Results of the inquiry.—III. Statistical tables.—IV. Past and present tendencies.—V. Conclusion.—VI. References to works on musical education.

21. PROFESSIONAL EDUCATION.

145. Contributions to the annals of medical progress and medical education in the United States before and during the War of independence, by Joseph M. Toner. Washington, 1874. 118 p.
149. Contributions to the history of medical education and medical institutions in the United States of America, 1776-1876, by N. S. Davis. Washington, 1877. 60 p.

Supplements the work by J. M. Toner (pub. no. 145).

190. Report on legal education, prepared by a committee of the American bar association and the U. S. Bureau of education. Washington, 1893. 207 p. Advance sheets of chapters 13-16, p. 376-578, Report of Commissioner for 1890-91.

This document describes legal education in North and South America, Europe, Australia, China and Japan. A bibliography is appended.

22. PROMOTION OF PUPILS.

177. Promotions and examinations in graded schools, by Emerson E. White. Washington, 1891. 64 p. (Circulars of information, 1891, no. 7.)
355. Classification and promotion of pupils. Reprint of chapter 7, p. 303-356, Report for 1898-99.

CONTENTS: The St. Louis system, as set forth in the St. Louis school reports, 1869-1874.—The Elizabeth (N. J.) plan of grading, by Supt. William J. Shearer.—The Seattle plan of promotion and classification, by Supt. Frank J. Barnard.—Plan of the North-side schools of Denver, by Supt. J. H. Van Sickle.—Promotion in the grammar schools of Cambridge (Mass.), by Supt. Francis Cogswell.—Report on the grading and promotion of pupils, by John T. Prince, agent of the Massachusetts state Board of education.

451. Age and grade census of schools and colleges, a study of retardation and elimination, by George Drayton Strayer. Washington, Government printing office, 1911. 144 p. (Bulletin, 1911, no. 5.)

23. RESEARCH.

398. Facilities for study and research in the offices of the U. S. Government at Washington, by Arthur Twining Hadley. Washington, 1909. 73 p. (Bulletin, 1909, no. 1.)

CONTENTS: I. Brief history.—II. Administration versus education.—III. Existing facilities for study and research.—IV. Obstacles to student research.—V. Conclusions.—VI. Appendix.

440. The biological stations of Europe, by Charles Atwood Kofoid. Washington, 1910. 360 p. illus., plates. (Bulletin, 1910, no. 4)

CONTENTS: I. The functions of biological stations.—II. Italy.—III. France and Monaco.—IV. Great Britain.—V. Germany.—VI. Austria-Hungary.—VII. Scandinavia.—VIII. Other European countries (Holland, Belgium, Spain, Finland, Russia, Bulgaria).—Bibliography.

24. SCHOOL ADMINISTRATION (STATE AND CITY).

363. State school systems: legislation and judicial decisions relating to public education, October 1, 1904, to October 1, 1906; by Edward C. Elliott. 2d ed. rev. Washington, 1907. 156 p. (Bulletin, 1906, no. 3.)

CONTENTS: Legislation relating to public education: A. Administrative control and supervision of elementary and secondary education; B. State finance and support; C. Local finance and support; D. Buildings and sites; E. Teachers in elementary and secondary schools; F. Teachers: employment, etc.; G. Teachers: professional training and education; H. School population and attendance; I. School discipline; J. Health regulations; K. Text-books and supplies; L. Subject-matter of instruction; M. Special types of school; N. Secondary education: high schools and academies; O. Higher educational institutions; P. Professional and higher technical education; Q. Private and endowed higher institutions; R. Libraries; S. Education of defectives and delinquents.

Recent decisions of state supreme courts.

364. Digest of school laws. Reprint of chapter 4, Report for 1904. Washington, 1907. 249-518 p.

This digest summarizes the school laws of the various states and territories, except Florida, Hawaii, Idaho, New Mexico, Utah, and Wyoming, under the heads of Organization of the system, Teachers, Schools, and Finances.

396. State school systems: II. Legislation and judicial decisions relating to public education, October 1, 1906, to October 1, 1908; by Edward C. Elliott. Washington, 1909. 364 p. (Bulletin, 1908, no. 7.)

CONTENTS: I. General explanations.—II. Table of legislative sessions.—III. Plan of classification.—IV. Bibliography.—V. Legislation relating to public education.—VI. Recent decisions of federal and state supreme courts.

438. State school systems: III. Legislation and judicial decisions relating to public education, October 1, 1908, to October 1, 1909; by Edward C. Elliott. Washington, 1910. 305 p. (Bulletin, 1910, no. 2.)

CONTENTS: I. General explanations.—II. Table of legislative sessions.—III. Plan of classification.—IV. Bibliography.—V. Legislation relating to public education.—VI. Recent decisions of state supreme courts.

450. Report of the Commission appointed to study the system of education in the public schools of Baltimore. Washington, 1911. 112 p. (Bulletin, 1911, no. 4.)

The Commission consisted of Elmer Ellsworth Brown, Ellwood P. Cubberley, and Calvin N. Kendall, assisted by Milo B. Hillegas and Harlan Updegraff.

465. Teachers' certificates issued under general state laws and regulations, by Harlan Updegraff. Washington, 1911. 269 p. (Bulletin, 1911, no. 18.)

The fundamental purpose of this study is to answer the question, What is the exact status of the legal provisions relating to certification of teachers in the various states at the present time?

25. SCHOOL ARCHITECTURE AND SANITATION.

104. Report on school architecture and plans for graded schools by the Commissioner of Education. Washington, 1870. 513-648 p. (Official circular no. 11. Reprint from Report for 1867-68.)

Profusely illustrated with views and plans of buildings, and useful for the history of American school architecture.

173. Sanitary conditions for schoolhouses, by Albert P. Marble. Washington, 1891. 123 p. illus. (Circulars of information, 1891, no. 3.)

A publication which has been widely useful in furthering improvement in schoolhouse construction, and is in demand to the present day.

444. American schoolhouses, by Fletcher B. Dresslar. Washington, 1911. 133 p. plates, plans. (Bulletin, 1910, no. 5.)

CONTENTS: Location of the schoolhouse.—Foundations.—Basements.—The classroom.—Special rooms; laboratories, etc.—Floors of school buildings.—Blackboards.—Doors.—Cloakrooms.—Halls.—Stairways.—Latrines and urinals.—Baths.—Lighting and heating of schoolrooms.—Ventilation.—School architecture and school improvement.—References on school architecture and sanitation.

26. SCHOOL HYGIENE.

68. Causes of deafness among school children and its influences on education, with remarks on the instruction of pupils with impaired hearing and on aural hygiene in the schools, by Samuel Sexton. Washington, 1881. 47 p. illus. (Circulars of information, 1881, no. 5.)

116. Vacation colonies for sickly school children. Washington, 1880. 4 p.

An account of colonies in Switzerland and Germany.

403. The daily meals of school children, by Caroline L. Hunt. Washington, 1909. 62 p. (Bulletin, 1909, no. 3.)

CONTENTS: I. Introduction.—II. The serving of food in schools.—III. Food for children.—IV. The underfed child.—V. Bibliography.

27. SECONDARY EDUCATION.

400. Statistics of secondary schools. Reprint of chapter 19, p. 695-1041, Report for 1906.

Contains: Statistics of students pursuing certain studies in 1905-06 (latest published). Lists of public high schools and private secondary schools, with statistics.

404. The teaching staff of secondary schools in the United States, amount of education, length of experience, salaries; by Edward L. Thorndike. 60 p. (Bulletin, 1909, no. 4)

CONTENTS: I. The nature of the data and sources of error.—II. The teaching staff of public secondary schools.—III. The teaching staff of private secondary schools.—IV. Men teachers and women teachers compared.—V. Tabular summary.—VI. Public and private secondary school teachers compared.—VII. The influence of length of experience upon efficiency in teaching.—VIII. The relation of length of experience to amount of salary in certain community groups.—IX. The relation of length of experience and of length of education to amount of salary in Ohio, Illinois, Wisconsin, Georgia, Texas, and California.—X. List of references on teachers' salaries.

409. Secondary education, by Elmer Ellsworth Brown. Reprint of chapter 12, Report for 1903. Washington, 1909. 553–583 p.

CONTENTS: The colonial period.—From the Revolution to the Civil war.—The high school movement.—Current movements and problems.

28. SOUTHERN STATES: EDUCATION.

290. The public school problem in the South, by C. W. Dabney. Reprint of chapter 20, p. 1009–1026, Report for 1900–1901.

29. SPELLING REFORM.

202. The spelling reform, by Francis A. March. A revision and enlargement of the author's pamphlet published by the U. S. Bureau of education in 1881. Washington, 1893. 86 p. (Circulars of information, 1893, no. 8)

30. SUNDAY SCHOOLS.

241. Sunday schools, by James H. Blodgett. Reprint of chapter 9, p. 349–425, Report for 1896–97.

31. TRAINING OF TEACHERS.

118. Educational tours in France, [by Jules Ferry]. Washington, 1880. 4 p.

A translation of a letter of the French minister of public instruction, explaining an interesting method designed to improve the qualifications of teachers in France, namely, the provision of holiday tours of observation for normal students receiving complete certificates.

150. Sketch of the Philadelphia normal school for girls. Washington, 1882. 39 p.

178. Rise and growth of the normal-school idea in the United States, by J. P. Gordy. Washington, 1891. 145 p. (Circulars of information, 1891, no. 8.)

Traces the development of the normal idea in this country from 1789 until the founding of the New York college for the training of teachers, including a chapter on chairs of pedagogy in universities.

449. Agencies for the improvement of teachers in service, by William Carl Ruediger. Washington, 1911. 157 p. (Bulletin, 1911, no. 3.)

CONTENTS: Official teachers' gatherings.—Teachers' institutes.—Summer schools.—Extension teaching.—Correspondence study.—Local teachers' meetings.—Visiting days.—County superintendents' conferences.—Teachers' associations.—Teachers' reading circles.—Pupils' reading circles.—Certification of teachers.—Sabbatical years.—Special funds for improvement of teachers.—The merit system of promotion.—Promotional examinations.—Classroom efficiency and success grades.—Measuring teachers' efficiency.—Participation of teachers in the determination of educational policies.

32. UNIVERSITIES AND COLLEGES: STATISTICS.

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334. Universities, colleges, and technological schools. Reprint of chapter 35, p. 1347-1497, Report for 1902.

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397. Statistics of state universities and other institutions of higher education partially supported by the state, 1907-8. Washington, 1909. 15 p. (Bulletin, 1908, no. 8.)
422. Statistics of state universities and other institutions of higher education partially supported by the state, 1908-9. Washington, 1909. 15 p. (Bulletin, 1909, no. 11.)
445. Statistics of state universities and other institutions of higher education partially supported by the state, 1909-10. Washington, 1911. 29 p. (Bulletin, 1910, no. 6.)

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TEACHERS' CERTIFICATES ISSUED UNDER GENERAL STATE LAWS AND REGULATIONS

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, D. C., October 3, 1911.

SIR: The teacher is the most important factor in the school; the selection of teachers the most important and difficult duty of school officers. Public funds and children must be guarded against incompetent teachers. To do this, all the States of the Union have by law provided for the examination of applicants and for some form of license or certification for those who pass the examination in such way as to indicate their fitness to teach and their ability to manage schools. Since each State controls its own school system, a certificate issued in one State has no inherent value in another. Teachers, therefore, moving from one State to another find it necessary to obtain a new license or certificate at the expense of another examination, unless there is some law in that State by which certificates or licenses granted in the former State may be recognized. Since many thousands of teachers move from one State to another every year and the numbers who do so are constantly increasing, this question of the recognition of certificates becomes very important. The purpose of examination and certification is to find good and competent teachers, not to impose upon them unnecessary burdens. If all States had the same standards the problem would be easy. Certificates of any given class issued in any State might then be recognized at their face value in all other States; but until now standards have varied widely, and universal recognition of certificates is therefore impossible. Notwithstanding this difficulty, the practice has become established in many States of recognizing certificates of the higher grades issued in other States in which there is an equivalency of requirements. In some of the North Central and Western States this recognition extends to certificates of lower grades, and everywhere there is a tendency toward a greater liberality in this matter.

So important has the question become that the chief State education officers have taken it up for formal and careful consideration in two conferences, held respectively at Lincoln, Nebr., May 31 and June 1, 1910, and at Salt Lake City, Utah, November 17, 18, 19, 1910. A third conference for this purpose has been called to meet at Topeka,

Kans., October 18, 19, 20, 1911. The conferences held have focused attention upon the desirability of removing all unreasonable barriers to the free and full recognition of all standard certificates, and of establishing such standards as will make this possible.

This Office has cooperated with the chief State education officers in their conferences. Dr. Harlan Updegraff, Specialist in School Administration, has attended both of the conferences already held, and he prepared the material upon which the deliberations of the second conference were partially based. The manuscript by Dr. Updegraff, which I have the honor to forward herewith, has been written primarily to meet the needs of future conferences; but it will, in my judgment, prove helpful to all administrators of public education and to the many teachers who desire to know about the system of certification in the United States. I, therefore, recommend its publication as a bulletin of the Bureau of Education.

Very respectfully,

P. P. CLAXTON,
Commissioner.

THE SECRETARY OF THE INTERIOR.

TEACHERS' CERTIFICATES ISSUED UNDER GENERAL STATE LAWS AND REGULATIONS.

INTRODUCTION.

This study was undertaken originally at the request of the first conference of chief State education officers regarding the recognition in each State of teachers' certificates and of diplomas of educational institutions issued in other States, held in Lincoln, Nebr., May 31 and June 1, 1910. In November, 1910, a limited edition of 200 copies of 124 pages of bound proof was issued as a means of assisting the second conference of these officers held in Salt Lake City, Utah, November 17, 18, and 19. This bound proof included the table showing the principal features of teachers' certificates in the various States (p. 12) and a summary of the laws and regulations in the various States governing the recognition of diplomas of higher educational institutions situated in the other States and of other certificates issued in other States. The completion of the study was delayed from time to time by reason of the pressing nature of other official duties which were more immediate in character, until it was thought best to incorporate in the study the acts of the 40 or more legislatures which convened during the past winter. This was especially desirable for the reason that there was much important legislation in a large number of States, part of which was due in a measure to the interest that had been awakened through the conferences above mentioned. No less than 10 States revised their entire systems of certification or enacted legislation which has brought about or will bring about radical changes in their systems. These States are New Jersey, Pennsylvania, Virginia, Georgia, Texas, North Dakota, Nebraska, Nevada, Idaho, and Oregon. In all, approximately one-half the States amended their laws; some—as Iowa, Missouri, and Kansas—making changes of considerable importance. This study includes all the changes in the States named above, except those in Georgia, which have not yet been made by the State board, and in all other States knowledge of which reached this office before it became necessary to close the subordinate tables so as to proceed with the analysis. Changes received later are given in the appendix.

All licenses to teach in the public schools of the United States, except those issued by city boards of education in accordance with conditions prescribed by such boards, are embraced in this study.

Diplomas and certificates of educational institutions that, either by law or by regulations of State boards, are declared licenses to teach are included, as well as those city certificates the conditions for the issuance of which are set forth in the acts of the State legislatures or in the regulations of State boards of education. In other words, every license that is fully defined in the educational laws of the State or in the regulations of the central educational authorities is made a part of this study, while any license which is framed for the most part by local regulations is omitted. It has not been possible, however, to make an analysis of the laws relating to those city certificates which are described.

The method of treatment is, first, the presentation of the provisions of the laws and regulations in certain principal tables, and, second, the analysis of the facts presented therein. The principal tables are as follows: (1) Principal features of teachers' certificates in the various States (Table 1, pp. 12-135); (2) Minimum age requirements (Table 32, pp. 226-28); (3) Fees (Table 33, pp. 228-31); (4) Revocation of certificates (Table 34, pp. 232-43); (5) Recognition of diplomas of educational institutions situated in other States and of certificates issued in other States (pp. 244-56). In the analysis of the facts presented the first table has received the greatest attention. This is due to the greater importance of the material it contains, and also to the fact that the other tables are not susceptible of so extended treatment. Facts are given a mathematical form and arranged in subordinate tables whenever possible in order to facilitate exact comparison. A summary of the results of the comparisons is given in text form in connection with the table.

The fundamental purpose of the study is to answer the question, What is the exact status of the legal provisions relating to certification of teachers in the various States at the present time? in such a way as to furnish data in the best form for use in the construction of standards of measurement for all certificates and in the preparation of standard systems of certification. No attempt is made to discuss the merits of various practices, although the superior advantages of certain features are made apparent in the natural development of the fundamental purpose of the study. Certain matters quite unimportant from this point of view, but of considerable interest in other connections, are omitted; as, for example, the number of times a year examinations are held, regulations governing the conduct of examinations and of the transportation of questions and papers between State and county officers.

It is thought desirable to show the differences in practice in different parts of the United States as well as in the different States. This has been done by observing the five geographical divisions that have been used in the Bureau of Education and other bureaus of the

National Government. It is only in some such way as this that those who are interested in standards can grasp most intelligently and effectively the situation as it exists in every section of the country.

The following outline map shows the States included in the various divisions:

There are certain facts which, because of their practical universality, are assumed to exist without specific mention. They are: (1) every teacher must be of good moral character, (2) experience to be accepted as qualification for a certificate must be successful experience, (3) in physiology and hygiene are included the nature and effects of stimulants and narcotics.

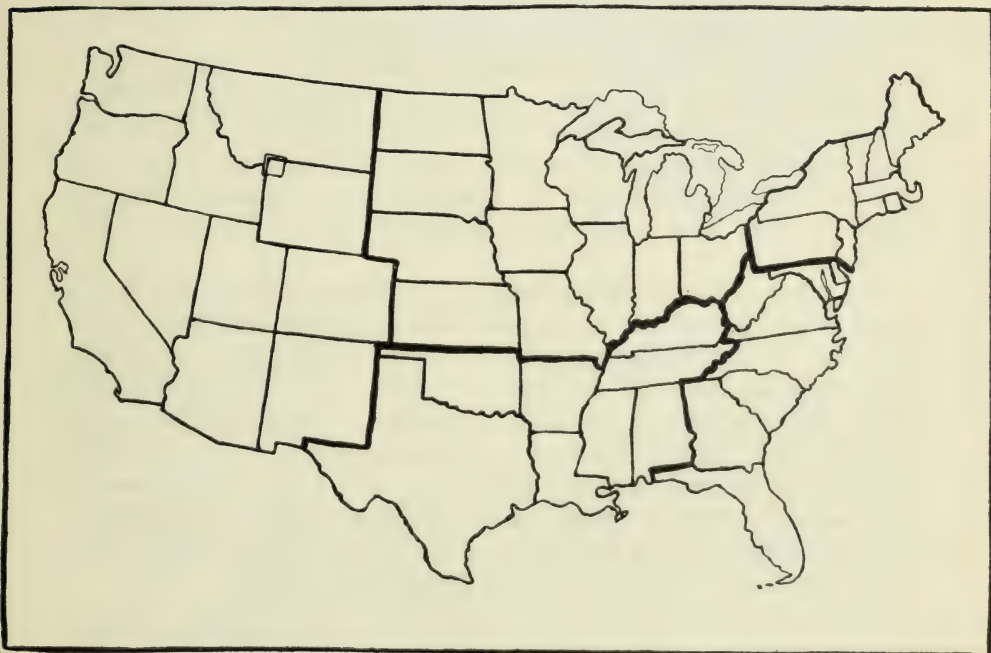


Fig. 1.—Geographical divisions observed in arrangement of subordinate tables.

In the principal tables the States are named in alphabetical order, but in all the subordinate tables and in the naming of States of which a particular fact is true the geographical order is followed, beginning with the North Atlantic States and proceeding through to those in the Western group. The order within the divisions of States is the same as that found in the tables.

All licenses to teach, whether legally known as diplomas, licenses, or certificates, and all diplomas and certificates of educational institutions valid as licenses to teach, are embraced in the generic name "certificate." The words "certificate" and "certificates" are used most frequently in their generic sense, meaning a kind or a class,

or kinds or classes, of certificates. Thus the statement that 10 certificates are issued in the State of Iowa means that 10 different kinds of certificates are issued.

PRINCIPAL FEATURES OF TEACHERS' CERTIFICATES.

The most important facts relating to a teacher's certificate are (1) the agency which issued it; (2) its form—territory in which valid, school or position in which the holder is authorized to teach, and duration; (3) its content—the scholarship, experience, and professional attainments to which it certifies; and (4) the effect of meeting the requirements for it, or of holding it, upon the issuance of subsequent certificates, or, in other words, its persistence. These principal features are contained in the table which follows.

This table includes all corrections made by the various State education offices in the table as printed in the bound proof edition, which included all legislation up to October 1, 1910. It has not been deemed necessary to request corrections of the changes embodied in the legislative acts of last winter, for the reason that the effect of such laws upon the systems already established seemed clear.

The name of the certificate found in the laws has been given in the table unless general use of another term indicated strongly the desirability of substituting the popular name. The highest certificate, as determined both by the right it bestows and the requirements which must be met, is given the precedence. State certificates are placed above county, and county certificates before city certificates. Within each of these divisions certificates valid in any school precede high school certificates, high school certificates precede elementary, while kindergarten and primary and special certificates follow. The certificate with the longer duration precedes the shorter.

Certificates of the same name but granted for different terms are for the sake of brevity given under one head. Certificates based upon one of several different sets of scholarship requirements are subdivided whenever necessary.

Blanks indicate either that there is no information required or that none is available.

TABLE 1.—THE PRINCIPAL FEATURES OF
ALABAMA.

[General Public School Laws of Ala., 1908, pp. 23-27; 1909, pp. 3-10 (passed at the special session of the legislature); Acts of 1911 (statement of superintendent of education).]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Life certificate.....	State superintendent and secretary board of examiners.	State.....	Any.....	Life.....	
First-grade certificate.	do.....	do.....	do.....	6 years.....	Nonrenewable.
Second-grade certificate.	do.....	do.....	do.....	4 years.....	do.....
Third-grade certificate.	do.....	do.....	do.....	2 years.....	do.....
Temporary certificate.	State board of examiners.	County specified.	do.....	Next examination report.	Second can not be issued unless regular certificate has been received during interim.
Local certificates ¹ ..					

ARIZONA.

[Ariz. School Laws, 1907, pp. 8-10, 14, 76-80.]

Life diploma.....	Territorial board of education.	Territory...	Any.....	Life.....	.....
Educational diploma.	do.....	do.....	do.....	6 years.....	Nonrenewable.
First-grade certificate: Upon examination.	Territorial board of examiners.	do.....	Grammar schools..	4 years.....	Renewable for 4 years by action of board if holder has taught 2 years.
Without examination.	do.....	do.....	do.....	do.....	do.....

NOTE.—References are given only to printed books and circulars; letters and memoranda from the various State offices, which constitute the sole authorities for many statements, are not cited.

TEACHERS' CERTIFICATES IN THE VARIOUS STATES.¹

ALABAMA.

[General Public School Laws of Ala., 1908, pp. 23-27; 1909, pp. 3-10 (passed at the special session of the legislature); Acts of 1911 (statement of superintendent of education).]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
5 years under Alabama first-grade certificate.	State board of examiners.	State board of examiners.	High degree of proficiency and professional attainment as shown (1) by sketch of his school work during any 5 years while holding a first-grade certificate, and (2) by discussion of questions involving history of education and theory and practice of teaching based on two or more books previously announced.
None	do	do	Examination in subjects required for second grade and in algebra, natural philosophy, plane geometry, school law, theory and practice of teaching, English and literature, with a minimum average of 75 per cent and grade of 50 per cent.
do	do	do	Examination in subjects required for third-grade certificate and in arithmetic, history of Alabama, civics and United States history, English grammar and composition, theory and practice of teaching, and intermediate geography, with minimum average of 75 per cent and grade of 50 per cent.
do	do	do	Examination in orthography, reading, penmanship, grammar, arithmetic (through fractions), primary geography, theory and practice of teaching, elementary principles of physiology and hygiene, United States history, and agriculture, with minimum average of 75 per cent and grade of 50 per cent.
do	No examination required		Recommendation of city or town superintendent or chairman of board of district trustees, approved by county superintendent; applicant must have been either not a resident of Alabama or ill at time of last examination.

ARIZONA.

[Ariz. School Laws, 1907, pp. 8-10, 14, 76-80.]

10 years, 1 in Arizona on first-grade certificate.	Board of examiners.	Board of examiners.	Examination in pedagogy, history of education, school economy, school government.
5 years, 1 in Arizona on first-grade certificate.	No examination required		None specified.
None	Board of examiners.	Board of examiners.	Examination in subjects required for a second-grade certificate and, in addition, algebra and natural philosophy, with an average of 80 per cent and minimum as in second grade below.
do .....	.....	.....	(1) Graduation from university or college having 4 years' course based on 4-year high-school course; (2) 1 year's work in education in a normal school, college, or university; (3) submission of diploma, recommendation of professors of education, and other papers. Condition (2) may be satisfied by passing examination in subjects required for life diplomas.

¹ Local certificates are granted by "separate districts" having 2,000 population or over. No detailed provisions in law. (Forty-two cities and towns had a population of 2,000 or over in 1910.)

TABLE 1.—*The principal features of teachers'*
ARIZONA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Second-grade certificate.	Territorial board of examiners.	Territory ..	Primary and assistant in grammar schools except in eighth grade.	3 years.....	Nonrenewable
Special certificate, commercial branches.	Territorial board of education.	do.....	Commercial subjects.	4 years.....	Renewable if holder has taught 3 years under certificate.
Manual training, domestic science, certificate without examination.	do.....	do.....	Subjects named.....	do.....	do.....
Manual training, domestic science, certificate upon examination.	do.....	do.....	do.....	do.....	do.....

ARKANSAS.

[Digest of School Laws, 1910, pp. 14-15, 25-28, 35-38. Acts of 1911, house bill No. 193.]

State certificate: Upon examination.	State superintendent.	State.....	Any.....	Life.....	.....
Without examination.	do.....	do.....	do.....	do.....	.....
Professional license: Upon examination.	do.....	do.....	do.....	6 years.....	May be renewed indefinitely. ¹
Without examination.	do.....	do.....	do.....	do.....	Life certificate.
First grade State certificate.	do.....	do.....	do.....	2 years.....	Indefinitely...
First-grade certificate.	County superintendent.	County.....	do.....	do.....	May be renewed indefinitely. ¹
Second-grade certificate.	do.....	do.....	do.....	1 year.....	Twice.....
Third-grade certificate.	do.....	do.....	do.....	6 months....	Once.....

¹ All renewals based on a requirement that the holder of any certificate must attend the "summer institutes."

certificates in the various States—Continued.

ARIZONA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	Board of examiners.	Board of examiners.	Examination in geography, history and civics, physiology, hygiene with special reference to the nature and effects of alcoholic drinks, etc., orthography, defining, penmanship, composition, reading, method of teaching, grammar, arithmetic, and the school laws of Arizona, with an average of 80 per cent, no grade less than 70 per cent in grammar, orthography, or arithmetic and not less than 50 per cent in any other subject.
.....do.....	do.....	do.....	Examination in spelling, arithmetic, grammar, composition, writing, bookkeeping, shorthand, typewriting, and commercial law, unless a holder of a territorial certificate, in which case first five may be omitted.
1 year's experience in teaching subject.	do.....	do.....	Graduate of a manual training or domestic science school.
None.....	Board of examiners.	Board of examiners.	Such examination as required if conditions as above set forth can not be met.

ARKANSAS.

[Digest of School Laws, 1910, pp. 14-16, 25-28, 35-38. Acts of 1911, house bill No. 193.]

.....	State superintendent.	State superintendent.	Examination in subjects required for a first-grade county certificate, and in addition, algebra, geometry, physics, rhetoric, mental philosophy, general history, Latin, natural history, botany, and geology.
.....	No examination required.....	.....	Holder of a State teachers' certificate, granted in another State, and satisfying the State superintendent that the examination of said applicant was of the standard required for issuance of a State license in Arkansas.
None.....	State superintendent.	State superintendent.	Examination in subjects required for a first-grade county certificate, and, in addition, algebra, plane geometry, general history, and rhetoric.
.....do.....	No examination required.....	.....	Normal school diploma or degree from an educational institution if State superintendent is satisfied that the course of study pursued was of the standard required for issuance of a professional license.
.....do.....	State superintendent.	State superintendent.	Holder of a first-grade county license, and satisfactory examination in the same branches as for a first-grade county license, the county superintendent forwarding all papers to the State superintendent for grading.
.....do.....	do.....	County superintendent.	Examination in subjects required for a second-grade certificate, and, in addition, civil government and elementary algebra. Minimum average, 85 per cent; minimum grade, 70 per cent.
.....do.....	do.....	do.....	Examination in subjects required for third-grade, and, in addition, history of Arkansas, physiology, and theory and practice. Minimum average, 75 per cent; minimum grade, 65 per cent.
.....do.....	do.....	do.....	Examination in spelling, reading, penmanship, English grammar, arithmetic, geography, United States history, elementary agriculture and horticulture. Minimum average 65 per cent; minimum grade, 60 per cent.

TABLE 1.—*The principal features of teachers'***CALIFORNIA.**

[School Law of Cal., 1909, secs. 1503, 1521, 1771-1775, 1778, 1787-1793.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Life diploma: High school....	State board of education.	State.....	Any.....	Life.....	.....
Grammar school.	do.....	do.....	Grammar and primary schools.	do.....	.....
Kindergarten-primary.	do.....	do.....	Kindergarten.	do.....	.....
Special kindergarten-primary life diploma.	do.....	do.....	Branches and grades named.	do.....	.....
Permanent certificates: Secondary.....	County board of education.	County, or city and county.	Any.....	do.....	.....
Grammar or elementary.	do.....	do.....	Grammar or primary.	do.....	.....
Kindergarten-primary.	do.....	do.....	Kindergarten.	do.....	.....
Special.....	do.....	do.....	Branches and grades named.	do.....	.....
Secondary-school certificate.	County board of education (on credentials only).	County.....	Any.....	6 years.....	Renewable at option of board; second renewal permanent. Permanent certificate may be given at time of first renewal.
Grammar or elementary school certificate.	County board of education.	do.....	Elementary.....	do.....	do.....

certificates in the various States—Continued.

CALIFORNIA.

[School Law of Cal., 1909, secs. 1503, 1521, 1771-1775, 1778, 1787-1793.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
24 months in high schools, normal schools or university; 21 in California.			Must have held and still hold a valid county or city and county certificate of same grade.
do.....			Do.
do.....			Do.
do.....			Do.
5 years; 20 months in high school in same county.			Holder of secondary school certificate or State diploma.
5 years in same county.			Holder of elementary certificate or State diploma.
do.....			Holder of kindergarten-primary certificate or State diploma.
do.....			Holder of special certificate or State diploma.
None or 20 months.	No examination given.	.....	One of following: (1) Holder of credentials approved by State board of education. Minimum requirements as follows: Graduation from an accredited 4 years' college course based on a 4 years' high-school course, and one year's graduate study in an approved institution, one-half of which was devoted to academic study and the remainder in a practice school of secondary grade in a university or normal school, and recommendation for a high-school certificate from the faculty in which pedagogical work was taken. (2) Holder of special credentials from State board of education. To obtain these it is necessary that applicant shall have taught 20 months and possess equivalent of requirements given under (1), sometimes determined by examination. (3) Holders of high-school certificates issued by other county boards.
None or 8 months..	County board of education.	County board of education.	One of following: (1) Examination in reading, writing, grammar and advanced composition, English and American literature, orthography and defining, vocal music, bookkeeping, arithmetic, algebra to quadratics, plane geometry, geography (physical, political, and industrial), elementary physics, physiology and hygiene, history of the United States, civil government, history (ancient, medieval, and modern), school law, methods of teaching. (2) Holder of life diploma or certificate of any State declared by State board to be equivalent to requirements for elementary life diplomas (3) Holder of normal-school diploma from State school and those declared of equal rank by State board. (4) Holder of diploma from University of California or Leland Stanford Junior University when said holder has completed six months' training in one of State normal schools or has had eight months' successful experience in public schools of State after graduation. (5) Grammar school or grammar grade certificate of any other county of California.

TABLE 1.—*The principal features of teachers'*
CALIFORNIA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Kindergarten - primary certificate.	County board of education.	County	Kindergarten.....	6 years.....	Renewable at option of board.
Special certificates..	do.....	do.....	Branches and grades named; limited to drawing, music, physical culture, commercial, technical, and industrial work.	do.....	Renewable at option of board. Second renewal permanent.
Temporary certificates (of grades corresponding to county certificates.)	County superintendent.	County....	Same as county certificates.	Maximum 6 months (expiring Jan. 1 or July 1 following issuance).	Not renewable. (Only one to same person in same county.)
Temporary elementary certificate.	do.....	do.....	do.....	2 years.....	do.....
City, or city and county certificates:					
Grammar.....	Board of education	do.....	Grammar or primary.	do.....	Renewable at option of board. Second renewal permanent.
Special.....	do.....	do.....	Same as county special.	do.....	do.....

COLORADO.

[School Laws of Colorado, 1909, pp. 33-36, 96-98. Sess. Laws, 1903, ch. 165, p. 421; Sess. Laws, 1909, ch. 165, p. 369.]

State diploma: Without examination.	State board of education.	State.....	Any.....	5 years.....	Renewable for 5 years in discretion of State board of education; then renewable for life.
Upon examination.	do.....	do.....	do.....	do.....	do.....
Without examination.	do.....	do.....	do.....	do.....	do.....

certificates in the various States—Continued.

CALIFORNIA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None or 8 months.	No examination; granted on credentials only.		One of following: (1) Holder of diploma of graduation from the kindergarten department of any State normal school. (2) Holder of credentials showing professional kindergarten training in institution approved by State board of education and also general education equivalent to that required for graduation from kindergarten department of State normal school. (3) Holder of kindergarten certificate issued by any other county board.
None.....	County board of education.	County board of education.	Board must satisfy itself by examination or credentials of special fitness to teach subjects, and also of proficiency in English grammar, orthography, defining, and methods of teaching.
None (see last column).	No examination required.....		(1) Holder of a valid secondary or high school, elementary or grammar school, kindergarten-primary or special certificate granted by county boards of education of California; (2) or graduate of a college, normal school, or university, who holds a valid certificate issued in another State and equivalent to a California certificate.
.....do.....	No examination required.....		Graduate of University of California or of Leland Stanford University.
Prescribed by city board of examiners.	City board of examiners.	City board of examiners.	Prescribed by city board of examiners.
.....do.....	do.....	do.....	Do.

COLORADO.

[School Laws of Colorado, 1909, pp. 33-36, 96-98. Sess. Laws, 1903, ch. 165, p. 421; Sess. Laws, 1909, ch. 165, p. 369.]

24 months.....	.....	.....	Graduation from a Colorado college maintaining standard 4-year course and requiring 4-year standard high-school course or equivalent for admission. Professional training equivalent to one-sixth standard 4-year course in at least three of these (one being No. 4): (1) General and educational psychology; (2) history of education; (3) science and principles of education; (4) practice teaching and special methods; (5) organization and management of schools; (6) philosophy, sociology, and anthropology.
.....do.....	State board of examiners.	State board of examiners.	Academic and professional attainments equivalent to above.
6 years' eminent educational service in Colorado.	.....	.....	

TABLE 1.—*The principal features of teachers'*

COLORADO—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Temporary certificate.	State board of education. County superintendent.	State.....	Any.....	5 years.....	Nonrenewable.
First-grade county certificate.		County ¹	do.....	3 years.....	Renewable once.
Second-grade county certificate.	do.....	do.....	do.....	18 months.....	do.....
Third-grade county certificate.	do.....	do.....	do.....	9 months.....	do.....
School district certificate (districts of first class.)	School district board.	District.....	do.....	Varies.....	Determined by district board.

CONNECTICUT.

[Laws relating to schools (1909), secs. 4, 118, 195, 210, 211, Connecticut School Documents No. 21, 1909, secs. 4, 67, 118, 210-212. Report of the board of education of the State of Connecticut to the governor, together with the report of the secretary of the board July 14, 1904-July 14, 1905, pp. 226-244. Letter from secretary of State board of education.]

Supervisor's certificate.	State board of education.	State.....	Any.....	At the pleasure of the board.	Renewable; successful experience.
Honor certificate ² .	do.....	do.....	do.....	Not longer than ² years.	do.....
Elementary certificate.	do.....	do.....	Subjects named in certificate.	do.....	do.....
Statutory certificate.	do.....	Town specified.	do.....	Not longer than ¹ year.	do.....

¹ County superintendent in emergency may recognize county teachers' certificates issued in another county or another State by indorsing same as "Good until next county examination."

County superintendent may issue a like grade certificate to a teacher holding a similar first-grade certificate of another county, good during life of certificate upon which it was issued.

certificates in the various States—Continued.

COLORADO—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	No examination required.....		Equivalent to qualifications described above for State diploma.
.....do.....	State superintendent.	County superintendent.	Examination in orthography, reading, writing, arithmetic, English grammar, geography, history, and Constitution of United States and the constitution of Colorado, civil government, physics, natural science, theory and practice of teaching, and school law of Colorado. If applicant is to teach in high school, examination shall extend to such additional branches as are to be pursued in such schools.
.....do.....	do.....	do.....	Same as first class, but lower percentage is required.
.....do.....	do.....	do.....	Do.
Varies.....	Determined by district board.....		Determined by district board.

CONNECTICUT.

[Laws relating to schools (1909), secs. 4, 118, 195, 210, 211, Connecticut School Documents No. 21, 1909, secs. 4, 67, 118, 210-212. Report of the board of education of the State of Connecticut to the governor, together with the report of the secretary of the board July 14, 1904-July 14, 1905, pp. 226-244. Letter from secretary of State board of education.]

Experience is required; no definite amount fixed.	State board of education.	State board of education.	Examination in school law, organization of public schools, courses of study, history of education in Connecticut, supervision, qualifications of teachers; also academic examination required for elementary certificate unless candidate (1) is a graduate of a college, university, or normal school; (2) holds a State elementary or honor certificate; or (3) has a high-school education and has had 5 years' successful experience as a supervisor, giving entire time to supervision.
Indefinite amount.....	do.....	do.....	Examination showing sound elementary knowledge in subjects required for elementary certificate, including examination upon preliminary papers, and, in addition, examination in art of teaching by actual demonstration, showing ability to teach and manage.
.....do.....	do.....	do.....	Examination showing elementary knowledge and special preparation for teaching in writing, English (including reading, writing, spelling, and grammar), arithmetic, elementary science (including physiology), geography, history, and civil government. Satisfactory preliminary papers must be submitted previous to admission to examination, showing evidence of professional study. Candidate must show in examination (oral) practical knowledge of subject matter of these papers, numbering 22 in all.
None.....	do.....	do.....	Examination must show "tolerable academic acquaintance" with reading, spelling, writing, arithmetic, English, grammar, rudiments of geography, United States history, physiology, and duties of citizenship.

² A holder of an honor certificate may obtain a "certificate of special excellence" in any subject covered therein by submitting a satisfactory thesis in that subject.

TABLE 1.—*The principal features of teachers'*
CONNECTICUT—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Kindergarten certificate.	State board of education.	State.....	Kindergartens....	Not longer than 2 years.	Renewable; successful experience.
Kindergarten honor certificate.	do.....	do.....	do.....	1 year.....	do.....
Certificate of special preparation.	do.....	do.....	Subject named....	1 or 2 years..	do.....
Certificate of special excellence.	State board of education.	State.....	Subjects named...	1 or 2 years..	do.....
Local high-school certificates.	High-school committee.	Town or district.	High school, branches named.	Indefinite...	At discretion of committee.
Local public-school certificate.	School visitors, school committee, or board of education.	do.....	Any specified school in branches named.	do.....	do.....

DELAWARE.

[School Laws for the Free Public Schools of Delaware, 1898-1909, pp. 6, 37-40, 55. Acts of 1911, chap. 94.]

Professional certificate.	County superintendent. ²	County ³ ...	Any.....	10 years....	Nonrenewable.
First-grade certificate.	do.....	do.....	do.....	5 years.....	do.....
Second-grade certificate.	do.....	do.....	do.....	2 years.....	do.....
Temporary certificate.	do.....	do.....	do.....	1 year.....	On authority of State board.

¹ No teacher may teach classes above third grade who has not passed a satisfactory examination in hygiene, including the effects of alcohol and narcotics on health and character. Other branches may be specified on certificate.

certificates in the various States—Continued.

CONNECTICUT—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
Must demonstrate ability to teach and manage by actual exercises in teaching.	State board of education.	State board of education.	Twenty preliminary papers in subjects named below, showing evidence of professional study. Examination upon these papers and in kindergarten gifts and occupations, music, drawing, English (including reading, spelling, grammar, English literature), penmanship, elementary science (including physiology), and history.
.....do.....	do.....	do.....	Same as for honor certificate.
No prescribed minimum.	do.....	do.....	A thesis on the special subject not included in honor or elementary certificates may be required. Examination may also include actual exercises in teaching.
.....do.....	Examination is required only when original examination shows some deficiency.	State board.....	Holder of honor certificate or approval of board of education in lieu thereof. Skill in teaching demonstrated by actual class exercises, as well as accurate knowledge, must be shown.
At discretion of committee.	State board.....	State board.....	At discretion of committee.
.....do.....	High-school committee or committee appointed by it (when examination given).	High-school committee or committee appointed by it (when examination given).	Examination in reading, writing, arithmetic, grammar, rudiments of geography and history, and rudiments of drawing if required. ¹
.....do.....	Authorities named in column 2; or special committee.	Authorities named in column 2; or special committee.	

DELAWARE.

[School Laws for the Free Public Schools of Delaware, 1898–1908, pp. 6, 37–40, 55. Acts of 1911, chap. 94.]

None.....	State board of education. ⁴	County superintendent.	Applicant must answer 90 per cent of questions asked in subjects specified under first-grade certificate below.
.....do.....	do.....	do.....	Applicant must answer 90 per cent of questions in each of following subjects: Orthography, reading, writing, mental arithmetic, written arithmetic, geography, physiology and hygiene with special reference to the effects of stimulants and narcotics, United States history, United States and Delaware constitutions, pedagogy, and grammar; and 75 per cent of questions on such other subjects as are specified by the State board of education.
.....do.....	do.....	do.....	Applicant must answer 75 per cent of questions asked in all subjects required for first-grade certificate.
.....do.....	No examination required.....		"Diploma or certificate of graduation from any respectable normal school or college."

¹ In accordance with the regulations of the State board of education.

² May be countersigned by superintendent of any other county.

⁴ County superintendent may prepare questions when so decided by State board.

TABLE 1.—*The principal features of teachers'*

FLORIDA.

[Digest of School Laws of the State of Florida, 1909, pp. 26-34, 97. Biennial Report of the Superintendent of Public Instruction of Florida, 1908, pp. 228-245.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Life certificate.....	State superintend- ent.	State.....	Any.....	Life.....	
State certificate.....	do.....	do.....	do.....	5 years.....	Reissued upon reexamina- tion.
Special certificate...	do.....	do.....	Branches specified.	do.....	do.....
Primary certificate, life.	do.....	do.....	Kindergarten, first, second, and third grade.	Life.....	
Primary certificate.....	do.....	do.....	do.....	4 years.....	Reissued upon reexamina- tion.
First-grade life cer- tificate: Upon examina- tion.	County superin- tendent.	County.....	Any.....	Life.....	
Without exam- ination.	do.....	State.....	do.....	Life in county.	
First-grade certifi- cate.	do.....	County; may be indorse d by other county superin- tendents.	do.....	5 years.....	Reissued upon reexamina- tion.
Second-grade cer- tificate.	do.....	do.....	do.....	4 years.....	do.....
Third-grade certifi- cate.	do.....	County.....	do.....	2 years.....	do.....
Temporary certifi- cate.	do.....	do.....	Elementary.....	Until next examina- tion.	Nonrenewable; one only to same person.

GEORGIA.

[Compilation of laws and decisions relating to the common-school system, 1910, p. 37-40.]

Permanent license	State school com- missioner.	State.....	Any elementary school.	Life.....	
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¹ County superintendent may or may not, at his own discretion, require an examination.

certificates in the various States—Continued.

FLORIDA.

[Digest of School Laws of the State of Florida, 1909, pp. 26-34, 97. Biennial Report of the Superintendent of Public Instruction of Florida, 1908, pp. 228-245.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
18 months under Florida State certificate.	No examination.....	.....	Must be a teacher in a high school or college in State and present satisfactory indorsement of eminent ability in teaching from three persons holding life certificates.
24 months; 8 under Florida first grade.	State superintendent.	State superintendent.	Examination in geometry, trigonometry, physics, botany, zoology, Latin, rhetoric, English literature, psychology, and general history; minimum average of 85 per cent and grade of 60 per cent.
None.....	do.....	do.....	Testimonials of peculiar fitness for teaching any subject not included in requirements for second-grade certificate; and examination with minimum grade of 90 per cent in such branches as are prescribed by State superintendent. (State certificate examination questions are given.)
4 years under primary certificate.	No examination required.....	.....	Satisfactory evidence of successful experience. Accomplished by indorsement of primary certificate.
None.....	State superintendent.	State superintendent.	Examination in primary studies, prescribed by State superintendent, with minimum average of 80 per cent; and testimonials of peculiar fitness for primary work.
20 years; 9 years under certificate since 1894.	(1)	(1)	"Faithful and successful as an instructor and disciplinarian." Accomplished by indorsement of first-grade certificate.
6 years under first-grade with average of 90 per cent.	.....	.....	Holder of first-grade certificate.
None.....	State superintendent.	Grading committee of county.	Examination in all subjects required for third-grade certificate and in algebra and physical geography, with a minimum average of 85 per cent and grade of 60 per cent.
do.....	do.....	do.....	Same examination as for third-grade; minimum average of 75 per cent and grade of 60 per cent.
do.....	do.....	do.....	Examination in orthography, reading, geography, arithmetic, geometry, United States history, physiology, theory and practice of teaching, composition, and agriculture.
do.....	do.....	do.....	Same as for third-grade certificate.

GEORGIA.

[Compilation of laws and decisions relating to the common-school system, 1910, p. 37-40.]

3 years.....	State school commissioner.	State school commissioner.	If in the judgment of the county school commissioner, any of the papers for first, second, or third grade licenses "exhibit unusual merit," he shall forward them "together with certificate of good moral and professional character of the applicant," to the State school commissioner, who may issue permanent license if in his opinion the papers exhibit "a sufficient degree of merit."
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TABLE 1.—*The principal features of teachers'***GEORGIA**—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
First, second, and third grade licenses.	County board of education.	County; may be indorsed by other county commissioners.	Any elementary school.	3, 2, and 1 years, respectively.	Reissued upon same conditions as original.
Temporary license.	do.....	County; can not be indorsed.	do.....	Until next examination.	No provision.

IDAHO.

[Acts of 1911, chap. 159, pp. 518-525.]

Life certificate: Upon examination.	State board of education.	State.....	Any.....	Life.....	.....
Without examination.	do.....	do.....	do.....	do.....	.....
State certificate: Upon examination.	do.....	do.....	do.....	8 years.....	Renewable at option of State board.
Without examination.	do.....	do.....	do.....	do.....	do.....
Specialist's State certificate (music, drawing, manual training, domestic science and physical education.)	do.....	do.....	Special department named in certificate.	do.....	do.....
First-grade certificate.	County superintendent.	State when filed in county.	Any.....	5 years.....	Renewable after 5 years' successful experience.

¹ Less experience is required of graduates of courses in chartered institutions covering 5 years above the eighth grade.

certificates in the various States—Continued.

GEORGIA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	State school commissioner.	County school commissioner.	Examination in orthography, reading, writing, geography, grammar, arithmetic, agriculture, science and practice of teaching, and physiology and hygiene, including nature and effects of alcohol, etc. Minimum averages as follows: First grade, 90 per cent; second grade, 80 per cent; third grade, 70 per cent.
.....do.....	County school commissioner.	do.....	Examination must be ordered by county board and only to meet an emergency.

IDAHO.

[Acts of 1911, chap. 159, pp. 518-525.]

5 years, 2 in State.. (See last column.)	State board of education.	State board of examiners.	Holder of valid Idaho State certificate and examination in such branches as State board of education may direct. Holder of life certificate from another State of approved educational standing. Must show professional training or qualifications by experience to instruct or manage any school in the State.
3 years ¹	do.....	do.....	Holder of a valid first-grade county certificate and examination in such branches as the State board of education may direct.
None, or 5 years; or 18 months, part of which within 2 years. (See last column.)	do.....	do.....	(1) Holder of B. A. or B. S. from University of Idaho finishing required course in department of education, or having taught 5 years in State. (2) Graduate of the advanced course (2 years' normal work above a 4-year high school course) of a State normal school of another State holding state or life certificate in such State, or a graduate of a college, the A. B. degree of which is recognized by the university of the State in which it is situated, when issuance of certificate is authorized by the State board; and 18 months' teaching experience, part of which within 2 years.
None.....	No examination required.	No examination required.	Graduate of an approved school offering a course of not less than 2 years in the special department, and based on graduation from an approved high school or an equivalent academic course.
8 months.....	State board of education.	State board of examiners.	(1) Examination in branches required for a second-grade and in addition, English literature, principles of teaching, algebra, physics or botany, and medieval and modern or English history. The county superintendent may transfer the grades of a holder of second-grade certificate who, after 8 months' successful teaching and 6 weeks' attendance at a professional school for teachers, has received credits in at least two subjects since receiving second-grade certificate. ²

² No county certificate is issued when average is less than 85 per cent, or any grade less than 75 per cent.

TABLE 1.—*The principal features of teachers'*
IDAHO—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Second-grade certificate.	County superintendent.	State when filed in county.	Any	3 years.....	Renewable upon reexamination, or after 2 years' teaching and 6 weeks' attendance at a professional school for teachers, earning credits in 2 subjects. ¹
Third-grade certificate.	do.....	County.....	do.....	1 year.....	Renewable upon reexamination, or upon 6 weeks' attendance, during life of certificate, at a professional school for teachers, earning credits in 2 subjects. ³
Special third-grade certificate.	County superintendent with approval of State superintendent.	do.....	do.....	do.....	Nonrenewable. Only 1 to same person.
Permit.....	do.....	do.....	do.....	Until next regular examination.	Nonrenewable. Only 1 within 3 years to same person.

ILLINOIS.

The School Law of Illinois, 1909, pp. 4, 48-49, Circular No. 42, office of superintendent of public instruction, Nov. 1, 1909.]

General certificate..	State superintendent.	State.....	Any	Life.....	.....
State elementary school certificate.	do.....	do.....	Any elementary school.	do.....	.....
State high-school certificate.	do.....	do.....	Any high school.....	do.....	.....
State supervisory certificate.	do.....	do.....	As principal or superintendent, any district.	do.....	.....

¹ Only two such certificates shall be given to one person after July 1, 1911.

² No county certificate is issued when average is less than 85 per cent, or any grade less than 75 per cent.

certificates in the various States—Continued.

IDAHO—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
8 months.....	State board of education.	State board of examiners.	Examination in all branches required for a third-grade certificate, and, in addition, physical geography, American literature, English composition, and cataloguing and use of school libraries. Standings of a third-grade certificate in force may be transferred to a second-grade after 8 months' teaching, and 6 weeks' attendance at a professional school for teachers receiving credits in at least 2 subjects since receiving third-grade certificate. ²
None or 8 months. ....do.....	do.....	do.....	Examination in orthoepy, spelling, reading, penmanship, arithmetic, elementary composition, grammar, geography, United States history, civil government of United States and of Idaho, physiology and hygiene with special reference to the effects of stimulants and narcotics, school law, Idaho elementary school manual, and the elements of agriculture; and, in addition, 8 months' teaching experience prior to July 1, 1911, or 6 weeks' attendance at a professional school for teachers, receiving credits in school law of Idaho, school management, and in methods of teaching reading and language, arithmetic, history, and geography.
None.....	do.....	do.....	Examination in subjects required for a third-grade certificate. Issued only when supply of legally qualified teachers has been exhausted.
.....do.....	No examination required.	do.....	Issued only when supply of legally qualified teachers has been exhausted, by indorsing certificates of other counties or States.

ILLINOIS.

[The School Law of Illinois, 1909, pp. 4, 48-49, Circular No. 42, office of superintendent of public instruction, Nov. 1, 1909.]

3 years.....	State superintendent.	State superintendent.	Examination in educational psychology, principles and methods of teaching, English, European, and United States history, algebra, civics, plane geometry, biological science, and physical science; Latin or a modern language; and a satisfactory thesis on one of the subjects listed by the State superintendent. Minimum average, 75 per cent; grade, 65 per cent.
1 year.....	do.....	do.....	Graduation from a State normal school or completion of an equivalent course, and an examination in first 3 subjects named above and a satisfactory thesis as above. Standings as above.
.....do.....	do.....	do.....	Graduation from an approved high school and university or other institution offering 4 years of work beyond a 4-year high-school course and examination and thesis as for State elementary certificate. Thesis must be upon a secondary school subject. Standings as above.
2 years of teaching or supervision.	do.....	do.....	Graduation from an approved college or normal school, or 10 years successful supervision in lieu thereof, and examination in English, educational psychology and history of education. Thesis, as above, on a problem of school administration. Standings as above.

² Not more than three third-grade certificates to one person after July 1, 1911.

TABLE 1.—*The principal features of teachers'*
ILLINOIS—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
State special certificate. (Vocal music, drawing, manual training, or household arts only.)	State superintendent.	State	One subject named	Life	
First-grade certificate. ¹	County superintendent.	County....	Any	2 years.....	At discretion of county superintendent.
Second - grade certificate.	...do.....	...do.....	...do.....	1 year.....	...do.....
Special certificates. (Music, drawing, penmanship, bookkeeping, German, or any other subject.)	...do.....	...do.....	Branches named..	Not fixed by law.	...do.....

INDIANA.

[School Laws of Indiana, 1907, pp. 20-29, 72-91, 228, 250, 262, 265. Laws 1911, chap. 81. Indiana Teachers' Licenses, Charles A. Greathouse, 1910 (pamphlet).]

Life State license (regular).	State board of education.	State.....	Any.....	Life.....	
Life State license (special for college graduates).	...do.....	...do.....	...do.....	...do.....	
Professional license.	...do.....	...do.....	...do.....	8 years.....	Reissued upon examination only.
State normal school diploma.	Board of trustees..	...do.....	...do.....	Life.....	
60-month high-school license.	State superintendent.	...do.....	Designated subjects in any high school; common branches in any public school.	60 months...	Reissued upon examination only.

¹ In any county in which a county normal school is established, the diplomas of graduates, when directed by the county board of education, may be accepted by the county superintendent as sufficient evidence of qualification of first-grade certificate. (School Laws, 1909, p. 48.)

certificates in the various States—Continued.

ILLINOIS—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	State superintendent.	State superintendent.	Graduation from a 4-year high-school course, 2 years of work in special subject in an approved institution, and same examination and thesis as required for State elementary certificate, the thesis to be on the educational value of the special subject. Standings as above.
.....do.....	County superintendent.	County superintendent.	Examination in subjects required for a second-grade certificate, and in addition, in elements of the natural sciences and physiology and laws of health. No standings named.
.....do.....	do.....	do.....	Examination in orthography, reading, penmanship, arithmetic, grammar, modern geography, civics, United States history, and history of Illinois. No standings named.
.....do.....	do.....	do.....	Examination only in special subject or subjects which applicant desires to teach.

INDIANA.

[School Laws of Indiana, 1907, pp. 20-29, 72-91, 228, 259, 262, 265. Indiana Teachers' Licenses, Charles A. Greathouse, 1910 (pamphlet).]

48 months.....	State board of education.	State board of education.	Applicant must have held two 36-month, a 36-month and a 60-month, or two 60 month licenses. Examination in rhetoric, geometry, general history, English literature, physical geography, and two of following: Chemistry, geology, and zoology. Minimum general average, 85 per cent; minimum grade, 75 per cent.
30 months; 10 in Indiana.	do.....	do.....	Graduation from a standard approved college; holder of one or more 60-month licenses or a professional license, and examination in any three of following subjects: General history of education, the school system and the school law of Indiana, educational psychology, experimental psychology and child study, leading school systems of Europe and America, and principles and methods of instruction. Same grades as above.
48 months.....	do.....	do.....	Same as for regular State license except subjects of examination, which are as follows: Algebra, civil government, American literature, science of education, and two of following six: Physics, botany, German, French, Spanish, and Latin.
2 years' successful experience after graduation. 1 or 3 years. (See scholarship requirements.)	No examination required.	do.....	Graduation from Indiana State Normal School.
	State board of education.	State superintendent.	Applicant must have had 1 year's experience previous to August, 1908, or be a teacher in class A or B with 3 years' experience and 3 years' normal training in an accredited school. ² Also examination as follows: Division I.—Common branches (see 36-month common-school license), with minimum average of 95 per cent and grade of 85 per cent. Division II.—(1) Literature and composition; (2) algebra or geometry, one required; (3) botany, zoology, chemistry, physics, or physical geography, one required; (4) history and civics, Latin, German, French, or Spanish, one required; (5) another subject to be selected from (2), (3), or (4). Minimum average, 85 per cent; grade, 75 per cent. Divisions must be taken separately, but both within same examination. Additional subjects may be taken.

²See p. 210.

TABLE 1.—*The principal features of teachers'*
INDIANA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
36-month high-school license.	State superintendent.	State.....	Designated subjects in any high school.	36 months...	Permanent, if 6 years' experience. Lapses if holder does not teach continuously.
24-month high-school license.	do.....	do.....	do.....	24 months...	Reissued upon examination only.
12 months' high-school certificate.	do.....	do.....	do.....	12 months...	do.....
36 months' common-school certificate.	do.....	do.....	Common branches.	36 months...	Same as 36 months' high-school license.
24 months' common-school license.	do.....	do.....	do.....	24 months...	Reissued upon examination only.
12 months' common-school license.	do.....	do.....	do.....	12 months...	do.....
36 months' primary-school license.	do.....	do.....	{ First, second, third, and fourth grades.	36 months...	{ Reissued upon examination only.
24 months' primary-school license.				24 months...	
12 months' primary-school license.				12 months...	
Kindergarten license.		do.....	Kindergarten	do.....	do.....
Kindergarten diploma.	Indorsed by State superintendent.	do.....	do.....	Life.....	do.....

¹In all literature examinations the manuscript is graded from 0 to 75 on correctness of answers and from 0 to 25 on the quality of English used.

²See p. 210.

certificates in the various States—Continued.

INDIANA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
1 or 3 years. (See scholarship requirements.)	State board of education.	State superintendent.	Same as for 60-month high-school license, except examination, which is as follows: Applicant must pass successfully (minimum average 95 per cent, grade 85 per cent) in science of education and one or more of following: Latin, German, French, Spanish, literature and composition, history and civics, physical geography, commercial geography, zoology, botany, physics, chemistry, commercial arithmetic, algebra, geometry, bookkeeping, and stenography. ¹
1 year. (See scholarship requirements.)	do.....	do.....	Applicant must have had 1 or more years' experience previous to August, 1908, or be a Class A ² teacher of 1 year's experience and 24 weeks' normal training in an accredited school, and must also pass successfully (minimum general average 90 per cent, grade 80 per cent) in one or more of subjects named in requirements for 36-month high-school certificate and science of education.
None. (See scholarship requirements.)	do.....	do.....	Applicant must have been a teacher prior to August, 1908, or be a graduate of a commissioned or certified high school with at least 12 weeks of normal training in an accredited school, and must also pass successfully (minimum average 85 per cent, grade 75 per cent) in one or more subjects named in requirements for a 36-month high-school certificate, and science of education.
Same as for 36 months' high-school certificate.	do.....	do.....	Same as for 36-month high-school license; except examination, which is as follows: Arithmetic, grammar, United States history, physiology and scientific temperance, geography, reading, writing, spelling, literature, science of education, drawing, and music. ³ Drawing and music are optional except in counties where they are specifically required. Examination in reading-circle books for current year may be substituted for examinations in analogous subjects. Minimum average 95 per cent, grade 85 per cent. A teacher holding this license is in Class C. ³
Same as for 24 months' high-school certificate	do.....	do.....	Same as for 24 months' high-school certificate, except examination, which is in same subjects as for 36 months' common-school certificate. Minimum average, 90 per cent; grade, 80 per cent. A teacher holding this license is in Class B. ³
None; same as for 12 months' high-school certificate.	do.....	do.....	Same as for 12 months' high-school certificate, except examination, which is in same subjects as for 36 months' common-school certificate. Minimum average, 85 per cent; grade, 75 per cent. A teacher holding this license is in Class A. ²
{ Same as for respective common-school license. }	do.....	do.....	{ Same scholarship requirements as for respective grades of common-school license, except that special primary questions are given in arithmetic, reading, grammar, and science of education.
None.....	do.....	do.....	Any person eligible to any other examination is eligible to this, which is in kindergarten theory and practice, music, drawing, and English. Minimum average, 85 per cent; grade, 75 per cent.
No examination required.....			Graduation from an approved kindergarten training school.

³ Grades in writing and spelling are determined from the manuscripts. Grammar and literature are graded from 0 to 90 on correctness of answers and from 0 to 10 on quality of English used.

TABLE 1.—*The principal features of teachers'*
INDIANA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Supervisor's license in music, art, manual training, sewing, and cooking.	State superintendent.	State.....	Supervisor or teacher of special subject in any public school.	12 months...	Reissued upon examination only.
Special license (rural and town schools).	State board of education.	do.....	Rural and town schools; common branches.	3 years.....	do.....
County high school: 36 months.....	County superintendent.	County.....	Same as for corresponding license issued by State		
24 months.....	do.....	do.....			
12 months.....	do.....	do.....			
County common school: 36 months.....	do.....	do.....	Same as for corresponding license issued by State		
24 months.....	do.....	do.....			
12 months.....	do.....	do.....			
County primary: 36 months.....	do.....	do.....	Same as for corresponding license issued by State		
24 months.....	do.....	do.....			
12 months.....	do.....	do.....			
Special teachers' license.	do.....	do.....	Branches named..	3, 2, or 1 year.	Upon examination only.

IOWA.²

[Code of Iowa. Secs. 2629-2631, 2634, 2734, Department of Public Instruction Circular No. 5, 1911.]

State diploma.....	State board of examiners.	State.....	Any.....	For life.....	.....
State certificate: Without examination.	do.....	do.....	do.....	5 years.....	(³)
Upon examination.	do.....	do.....	do.....	do.....	.....
Primary teachers' State certificate.	do.....	do.....	First, second, and third grades.	do.....	do.....
Special State certificate (including kindergarten).	do.....	do.....	Any, in subjects or departments named.	do.....	Same as for State certificate.

¹ See p. 209.

² See appendix, p. 257.

certificates in the various States—Continued.

INDIANA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None; same as for 12 months' common-school license.	State board of education.	State superintendent.	Same as for 12 months' common-school license except examination, which is in special subject (minimum grade, 85 per cent) and, if not a graduate of a commissioned high school, in literature and composition, arithmetic, United States history, and physiology, and scientific temperance (minimum average, 85 per cent; grade, 75 per cent). Courses in approved schools in special subject will be accepted in lieu of normal training.
None.....	..do.....	State board of education.	Completion of special 2 years' course for teachers in accredited schools. Holders of this license who have no experience are in class A; those with one or more years' experience are in class B. ¹
superintendent.....	.....	{ County superintendent. .....do..... .....do..... }	{ Same as for corresponding license issued by State superintendent.
superintendent.....	.....	{ .....do..... .....do..... .....do..... }	{ Do.
superintendent.....	.....	{ .....do..... .....do..... .....do..... }	{ Do.
None.....	State board of education.	do.....	None specified. Papers may be sent to State superintendent for grading.

IOWA.²

[Code of Iowa. Secs. 2629–2631, 2634, 2734, Department of Public Instruction Circular No. 5, 1911.]

5 years.....	State board of examiners.	State board of examiners.	In addition to branches required for a State certificate, examination in geometry, trigonometry, chemistry, zoology, geology, astronomy, political economy, English literature, and general history.
None.....	.....	.....	(1) Graduation from State university, normal schools, and colleges of agriculture, and other educational institutions in the State having regular collegiate courses of equal rank. The record must show at least 6 semester hours in psychology and 14 in education. (2) Holder of a certificate issued by State department of education in another State, upon evidence of scholarship and experience equivalent to that required for like certificate in Iowa.
2 years.....	State board of examiners.	State board of examiners.	Examination in orthography, reading, writing, arithmetic, geography, English grammar, bookkeeping, physiology, history of United States, algebra, botany, physics, drawing, United States civics, Iowa civics, school laws of Iowa, didactics.
..do.....	..do.....	..do.....	Examination in psychology of the child, school management, history of education, school laws of Iowa, drawing, primary methods, plant study, vocal music, physical culture.
None.....	..do.....	..do.....	Same as for special county certificate.

³ Renewable for life upon proof of at least 5 years' successful teaching, three of which shall have been during the time the said certificate (with renewals) has been in force.

TABLE 1.—*The principal features of teachers'*

IOWA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Normal training-course certificate.	Superintendent of public instruction.	State.....	Any.....	2 years.....	After 36 weeks' successful experience certified to by county superintendent under whom teaching was done, holder shall receive a county certificate of a grade corresponding to his qualifications.
First-grade county certificate.	State board of examiners.	do.....	do.....	3 years.....	Renewable upon proofs of successful teaching and professional study during life of certificate. ¹
Second-grade county certificate.	do.....	do.....	do.....	2 years.....	do.....
Third-grade county certificate.	do.....	do.....	do.....	1 year.....	Renewable once on evidence of successful teaching. Not more than 2 may be issued to same person.
Provisional county certificate.	do.....	do.....	Limited to county for which issued.	6 months....	Not renewable.
Special county certificate (including kindergarten).	do.....	do.....	Any, in subjects or departments named.	3 years.....	Same as for first-grade county. ³

KANSAS.⁴

[Laws relating to the common schools of Kansas, 1909, pp. 18-24, 27-34, 115, 129-130, 143. Manual of the Board of Education, State of Kansas, 1910, pp. 5-38. Laws 1911, chap. 276.]

Life diploma.....	State board of education.	State.....	Any.....	Life.....	.....
Life certificate.....	do.....	do.....	do.....	do.....	Lapses if holder is not engaged in school work for 3 years.

¹ Renewable for life upon proof of at least 5 years' successful teaching, three of which shall have been during the time the said certificate (with renewals) has been in force.

² Holder of a second-grade certificate may build to a first-grade certificate by making the required grades, and by examination in the additional required branches, subject to the requirements of 36 weeks' experience. Likewise a holder of a third-grade certificate may build to a second or a first grade, applicant having the privilege of being examined in one or more of such branches at any regular examination.

³ See appendix, p. 257.

certificates in the various States—Continued.

IOWA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	No examination required.	No examination required.	Certificate of graduation from the high school normal training course, the examination for graduation being conducted under rules of the State board of examiners.
36 weeks.....	State board of examiners.	State board of examiners.	Examination in reading, orthography, writing, arithmetic, geography, grammar, United States history, music, physiology and hygiene with reference to effects of stimulants and narcotics, elementary civics, elementary economics, elementary physics, and elementary algebra.
None.....	do.....	do.....	Same as for first-grade county certificate, except that an examination in the last four subjects named above is not required. Lower average required. ²
do.....	do.....	do.....	Examination in the same subjects required for a second-grade county certificate. Lower average required. (See note at bottom of p. 36.)
do.....	do.....	do.....	Examination in the same subjects required for a third-grade county certificate. Lower minimum grade accepted.
do.....	do.....	do.....	Examination in the subject or group of subjects for which a certificate is sought, and per cents therein, such as are required for a first-grade county certificate.

KANSAS.

[Laws relating to the common schools of Kansas, 1909, pp. 18-24, 27-34, 115, 129-130, 143. Manual of the Board of Education, State of Kansas, 1910, pp. 5-38. Laws 1911, chap. 276.]

5 years; 2 in State.	State board of education.	State board of education.	Examination in all subjects required for a 3-year certificate and, in addition, in political economy, zoology, and Latin, German, or French. Minimum average, 85 per cent; minimum grade, 70 per cent.
2 years under 3-year renewable certificate.	No examination required.....		Holder of 3-year renewable certificate.

¹ The State board of education has established the following rules governing the renewal of normal-training certificates:

First. Evidence of successful experience and professional interest on the part of holders of such certificates satisfactory to the State board of education.

Second. Holders shall attend 2 county teachers' institutes, provided that attendance at an approved summer training school for 2 summers shall be accepted in lieu of such institute attendance.

Third. Holders shall pursue such a course of professional reading as shall be outlined by the State board of education.

Fourth. Holders shall have taught 1 year of at least 20 weeks out of the 2 years, provided that attendance at a recognized institution of higher learning for 2 years shall be accepted in lieu of the required teaching experience.

It is expected that holders will attend 1 of the 2 institutes required before beginning to teach.

TABLE 1.—*The principal features of teachers'***KANSAS**—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
3-year renewable certificate (upon complete examination to non-graduates).	State board of education.	State	Any	3 years	Life certificate granted if 2 years of successful experience.
3-year renewable certificate [without examination to graduates (arts course)].	do.....	do.....	do.....	do.....	do.....
3-year nonrenewable certificate (normal practice teaching course).	do.....	do.....	do.....	do.....	Nonrenewable. May secure renewable certificate by passing examination in professional subjects.
Industrial certificates: Manual training. Upon examination.	do.....	do.....	Any school in subjects named, provided holder has also a valid Kansas teacher's certificate.	1 year.....	Renewable 2 years if experience is satisfactory; 1 year without experience.
Without examination.	do.....	do.....	do.....	do.....	do.....
Domestic science. Upon examination.	do.....	do.....	do.....	do.....	do.....
Without examination.	do.....	do.....	do.....	do.....	do.....
Normal training certificate.	do.....	do.....	Any.....	2 years.....	2 years at a time; indefinitely. ¹

¹ The State board of education has established the following rules governing the renewal of normal training certificates:

First. Evidence of successful experience and professional interest on the part of holders of such certificates satisfactory to the State board of education.

Second. Holders shall attend 2 county teachers' institutes, provided that attendance at an approved summer training school for 2 summers shall be accepted in lieu of such institute attendance.

Third. Holders shall pursue such a course of professional reading as shall be outlined by the State board of education.

Fourth. Holders shall have taught 1 year of at least 20 weeks out of the 2 years, provided that attendance at a recognized institution of higher learning for 2 years shall be accepted in lieu of the required teaching experience.

It is expected that holders will attend 1 of the 2 institutes required before beginning to teach.

certificates in the various States—Continued.

KANSAS—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
1 year.....	State board of education.	State board of education.	Examination in first 15 subjects named under professional certificate, and in addition, plane and solid geometry, physical geography, mediæval and modern history, botany, general psychology, history of education, school law, methods of instruction, school management, chemistry, drawing, and music. For any 2 of the last 3 named, any 2 of the following 3 may be substituted: Zoology, political economy or Latin, including Cæsar and Virgil. Standings as under life diploma.
.....do.....			Graduation from educational institution placed on the accredited list by the State board of education. See p. —.
20 weeks of practice teaching.	No examination required.....		Graduation from the normal course of certain Kansas institutions whose courses of study include all subjects required for the 3-year certificate and have received the approval of the State board of education.
None.....	State board of education.	State board of education.	Examination must show ability to teach both theory and laboratory work in clay modeling, cardboard construction, basketry, joinery, furniture making, wood turning, and mechanical drawing in elementary and high schools.
.....do.....			Graduation from accredited course in a manual-training institution.
.....do.....	State board of education.	State board of education.	Examination must show ability to teach sewing and cooking in elementary and high schools.
.....do.....			Same as for manual-training certificate (without examination).
.....do.....	State board of education.	Examiners appointed by State board of education.	The applicant must be a graduate of a 4-year high-school course approved by the State board of education. That course must include a prescribed course in normal training. The applicant is examined in arithmetic, grammar, geography, reading, American history, psychology, methods of instruction, and school management. Minimum average, 80 per cent; minimum grade, 60 per cent.

TABLE 1.—*The principal features of teachers'*

KANSAS—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
First-grade certificate.	County board of examiners.	County, except in cities of first and second class. May be indorsed in other counties for unexpired time.	Any	3 years.....	Renewed for 3 years without examination, provided certain conditions are met. ²
Second-grade certificate.	do.....	do.....	do.....	2 years.....	(³)
Third-grade certificate.	do.....	do.....	do.....	1 year.....	Reissued once upon examination if holder has taught 3 months.
Temporary certificates.	County superintendent.	District named.	do.....	Until close of next examination.	Can not be re-issued to same person at expiration of time set.
Local certificates: Cities of first and second class. ⁴	Examining committee.	City.....	Department named.	Varies.....	Varies.....
Common-school district having over 10 teachers.	do.....	District.....	do.....	do.....	do.....
County high school.	do.....	County.....	High school named.	do.....	do.....
Institute certificates: Conductor's.....	State board of education.	State.....	Institutes.....	1 year.....	Renewable for 5 years to holder who has successfully conducted one institute.
Instructor's.....	do.....	do.....	do.....	do.....	Renewable for 3 years to holder who has taught successfully in one institute.
Special certificate.	do.....	do.....	Branches named	do.....	Renewable for 1 year.

¹ Varying amounts of work in an accredited high school or its equivalent will be required in the future of applicants for any grade certificate, as follows: After May 1, 1913, 1 year of work; after May 1, 1915, 2 years of work; after May 1, 1917, 4 years of work.

This requirement does not apply to any person who shall have taught at least 6 school years before May 1, 1912. The board of education is empowered to make such temporary modifications of these requirements as may be necessary to supply the schools with teachers.

certificates in the various States—Continued.

KANSAS—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
12 months.....	State board of education.	County board of examiners.	Examination in all subjects required for second-grade certificate and such additional branches as State board may prescribe. Minimum standings 90 per cent and 75 per cent. ¹
3 months.....	do.....	do.....	Examination in all subjects required for third grade and such additional branches as State board may prescribe. Minimum standings 80 per cent and 60 per cent. ¹
None.....	do.....	do.....	Examination in orthography, reading, writing, grammar, geography, arithmetic, history of Kansas, United States history, Constitution of United States, physiology and hygiene, agriculture, and principles and methods of teaching with minimum average of 75 per cent and minimum grade of 60 per cent.
.....do.....	County superintendent when examination is required.		Upon written request of a district board county superintendent may issue certificate if he believes the applicant possesses "the necessary qualifications of a teacher."
Varies.....	Examining committee when examination is required.		Varies; as determined by each local board Must be judged competent to teach in department named.
.....do.....	do.....		Do.
.....do.....	do.....		Do.
8 years as a teacher.	No examination required.....		Must have taught successfully under certificate in three normal institutes, not more than two of which were in the same year. This rule may be waived in the case of applicants of high professional standing and long experience in educational work.
5 years as a teacher.	do.....		Holder of State certificate or life diploma or one whose professional experience and ability warrants.
Not fixed.....	do.....		"Board must be satisfied as to special qualifications."

² Conditions are as follows: (1) No nonteaching period of more than 2 years; (2) attended 90 per cent of last county institute or 6 weeks professional training in some approved school; and (3) does such professional work as State or county superintendent may direct.

³ Holder may build toward a first grade certificate. Any grade of 90 per cent or more secured at not to exceed 4 regular examinations may be retained for 2 years and applied toward such first-grade certificate.

⁴ Cities having a population of 2,000 or over.

TABLE 1.—*The principal features of teachers'*

KENTUCKY.

[Common School Laws of Kentucky, 1910, pp. 12, 27-33, 133-134, 158, 166. Biennial Report of State Superintendent of Public Instruction of Kentucky, 1908-9, pp. 28-29.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
State diploma.....	State board of examiners.	State.....	Any.....	Life, unless holder fails to teach 2 successive years.	.....
State certificate.....	do.....	do.....	do.....	8 years, unless holder fails to teach 2 successive years.	Renewed for original period on recommendation of county board of examiners.
University diploma (B. A. in education).	Board of trustees (approved by State superintendent).	do.....	do.....	Life.....	.....
Advanced university and normal-school certificates.	Board of trustees of univ., board of regents of normal schools, subject to approval of State superintendent.	do.....	do.....	3 years.....	Renewed for life upon evidence of successful teaching and approval of State superintendent.
Intermediate university and normal-school certificate.	do.....	do.....	do.....	4 years.....	Nonrenewable.
Elementary university and normal-school certificate.	do.....	do.....	do.....	2 years.....	do.....
Kentucky Normal and Industrial Institute certificates.	Board of trustees.	do.....	Colored schools....	Life.....	.....
First-class county certificate.	County board of examiners.	County.....	Any.....	4 years.....	May be renewed annually for 4 years if holder has taught 8 consecutive years under first-grade certificate.
Second-class county certificate.	do.....	do.....	do.....	2 years.....	Nonrenewable.
Third-class county certificate.	do.....	do.....	do.....	1 year.....	Not issued more than once to same person.

certificates in the various States—Continued.

KENTUCKY.

Common School Laws of Kentucky; 1910, pp. 12, 27-33, 133-134, 158, 166. Biennial Report of State Superintendent of Public Instruction of Kentucky, 1908-9, pp. 28-29.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
2 years in State....	State board of examiners.	State board of examiners.	Examination in subjects required for a State certificate and, in addition, in geometry, physics, and elementary Latin with minimum average of 90 per cent and grade of 70 per cent.
2 years.....	do.....	do.....	Examination in subjects required for county certificates and in English literature, algebra, higher arithmetic, and psychology, with a minimum average of 90 per cent and grade of 70 per cent, and recommendation of county board of examiners.
None.....	.....	.....	Bachelor of Arts in education from State university.
do.....	.....	.....	Completion of 3 years' work in department of education of State university or in State normal schools.
do.....	.....	.....	Same, except 2 years' work.
do.....	.....	.....	Same, except 1 year work.
do.....	.....	.....	Graduation from institution.
do.....	State board of examiners.	County board of examiners.	Examination in spelling, reading, writing, grammar, geography, arithmetic, United States history, history of Kentucky, composition, physiology and hygiene, including nature and effects of alcoholic drinks, etc., with minimum average of 85 per cent and grade of 65 per cent.
do.....	do.....	do.....	Same, except minimum average of 75 per cent and grade of 55 per cent.
do.....	do.....	do.....	Same, except minimum average of 65 per cent and grade of 50 per cent.

TABLE 1.—*The principal features of teachers'*
LOUISIANA.

[Sixth compilation of the Laws of Louisiana relating to public schools, 1908, pp. 65-69, 122, 146, 147.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence
		Territory.	Schools.		
State certificate....	State board of examiners.	State.....	Any.....	10 years.....	May be renewed by board.
First-grade certificate.	Parish board of examiners.	Parish; papers may be sent to another parish superintendent upon his request.	do.....	5 years.....	Extended 1 year for attendance State summer normal school for 9 weeks or more.
Second-grade certificate.	do.....	do.....	do.....	3 years.....	Extended 1 year for attendance State summer normal school 9 weeks.
Third-grade certificate.	do.....	do.....	do.....	1 year.....	Renewed 1 year if summer school is attended 9 weeks.
Normal-school diploma.	Institutions named in last column.	State.....	do.....	4 years.....	Renewed for 4 years by authority issuing diploma. ¹
Special certificate..	Parish examining committee.	Parish.....	Special academic department named.	5 years.....	Nonrenewable.

¹ State superintendent may renew for graduates of Peabody Normal School.

certificates in the various States—Continued.

LOUISIANA.

[Sixth compilation of the Laws of Louisiana relating to public schools, 1908, pp. 65-69, 122, 146, 147.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	State board of examiners.	State board of examiners.	Examination in subjects required for first-grade certificate and also in literature, chemistry, bookkeeping, Latin, general history, botany, history of education, psychology, and school administration. Completion of course in any subject by a graduate of any institution in Louisiana authorized by law to issue diplomas certified to by the president of such institution secures credit of satisfactory examination in that subject. This does not apply to subjects in the field of education.
.....do.....	State superintendent.	Parish board of examiners.	If applicant holds a valid second-grade certificate, examination in higher algebra, physics, geometry, penmanship and drawing, theory and art of teaching, English grammar and composition, arithmetic (written and mental), political and physical geography, United States history, and agriculture. If applicant holds a third-grade certificate, also in reading, constitutions of Louisiana and of the United States, and spelling. An applicant who holds no certificate nor is a graduate of an institution authorized to issue diplomas must, in addition to the first-grade subjects, take the third-grade examination in physiology and hygiene and the second-grade examination in constitutions of Louisiana and of the United States and spelling.
.....do.....	do.....	do.....	Examination in grammatical analysis, physical and political geography, elementary algebra, theory and art of teaching, arithmetic, United States history, agriculture, reading, constitutions of Louisiana and United States, and spelling. If applicant does not hold third-grade certificate, also in penmanship and drawing, and physiology and hygiene. Minimum average, 80 per cent; minimum grade, 50 per cent. Average of 70 per cent entitles applicant to third-grade certificate.
.....do.....	do.....	do.....	Examination in spelling, reading, penmanship, drawing, arithmetic, English grammar, geography, United States history, constitutions of United States and of Louisiana, physiology and hygiene, with special reference to the effects of stimulants and narcotics, and theory and art of teaching. Minimum average, 75 per cent; minimum grade, 40 per cent.
.....do.....	do.....	do.....	Diplomas from Peabody Normal School; State normal school; city normal school, New Orleans; department of philosophy and education Louisiana State University; Teachers' College of Tulane University.
.....do.....	State superintendent.	Parish examining committee.	Examination in subjects to be taught.

NOTE.—General average obtained upon examination is increased 15 per cent for attendance upon State summer normal schools for nine weeks. Examinations must be taken within one year from date of attendance.

TABLE 1.—*The principal features of teachers'***MAINE.**

[Maine School Laws, 1909, pp. 13, 38. Circulars "Examination for State certificates," 1904, "Conditions of granting State certificates of superintendence grade," 1910.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
State certificates: Upon examination. Superintendence grade.	State superintendent.	State.....	Superintendent...	Life or 5 years. ¹	Renewable for life.
Public - school grade.	do.....	do.....	Any.....	Life, 5, 3, or 1 year. ¹	One renewal without re-examination.
Grammar or common school grade.	do.....	do.....	Common schools..	do.....	do.....
Common-school grade.	do.....	do.....	do.....	do.....	do.....
Primary or common school grade.	do.....	do.....	do.....	do.....	do.....
Without examination.	do.....	do.....	(⁴)	do.....	do.....
Town certificate...	Town superintendent.	Town.....	Branches upon which examined.	1 year.....	Renewable without examination.

¹ Persons having had less than 5 years' experience in school supervision are eligible for the 5-year certificate; those who present evidence of successful work as superintendents for 5 or more years are eligible for the life certificate.

² See page 209.

³ The preliminary examination consists of filling out a blank form concerning the life, education, experience, special preparation, and reading of the applicant and other facts bearing upon his probable ability as a teacher. The names of 5 references are also required.

certificates in the various States—Continued.

MAINE.

[Maine School Laws, 1909, pp. 13, 38. Circulars "Examination for State certificates," 1904, "Conditions of granting State certificates of superintendence grade," 1910.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
Not less than 2 years' experience as superintendent of schools or as a school principal with supervisory powers. 18, 9, 5, or 0 terms ² .	State superintendent.	State superintendent.	Written examination in school law, methods of teaching, school management, educational psychology, history of education, and school administration.
.....do.....	do.....	do.....	Written examination in reading, writing, spelling, arithmetic, geography, English grammar, United States history, physiology and hygiene, elementary science or nature study, civil government, theory and practice of teaching, and school law; minimum average 90 per cent, minimum grade 70 per cent; also graduation from college or full college-preparatory course of first-class seminary of exceptionally high rank with ability to teach college preparatory studies, including at least one ancient and one modern language, and a recommendation for high school work given by references. Reports of references are taken into account, ³ also statements contained in preliminary examination. ²
.....do.....	do.....	do.....	Examination in same subjects; minimum average 80 per cent, minimum grade 70 per cent. Account also taken of statements of references and of preliminary examination. ^{2 3}
.....do.....	do.....	do.....	Same, except minimum average and grade 70 per cent and 50 per cent. ^{2 3}
.....do.....	do.....	do.....	Same, except no minimum average is stipulated, and minimum grade is placed at 35 per cent.
.....do.....	do.....	do.....	Graduation from a Maine State normal school. ⁴
As determined by town superintendent.	Town superintendent.	Town superintendent.	Examination in reading, spelling, grammar, geography, history, arithmetic, civil government, bookkeeping, physiology with special reference to effect of alcoholic drinks, stimulants, and narcotics, elements of the natural sciences especially as applied to agriculture, and such other branches as superintending school committee desires to introduce into the public school, particularly into the school for which he is examined.

⁴ Graduates of State normal schools are admitted to all classes of State certificates. In determining the grade of certificate to be given to each graduate, consideration is given to the grade of work done by the student during the course, experience in teaching, if any, before entrance to the course, and rank attained in examination.

TABLE 1.—*The principal features of teachers'***MARYLAND.**

[The Public School Laws of 1910, pp. 12, 24, 26, 31-32. By-Laws, Rules, and Regulations of the Public School System of Maryland, 1908, pp. 18-21.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Life certificate: Without examination.	State board of education.	State.....	Any.....	Life.....	
Upon examination.	do.....	do.....	do.....	do.....	
State normal diploma.	do.....	do.....	do.....	do.....	
State normal certificate.	Principal of school and State board.	do.....	do.....	5 years.....	Renewed for life, upon 2 years' experience and recommendation of county superintendent.
University, college, and normal diplomas.	Indorsed by State superintendent.	do.....	do.....	Varies; may be for life.	
County certificates: First grade..... First class..... Second class..... Second grade..... First class..... Second class.....	County superintendent.	County.....	do.....	6 months after election to a position within 15 months after date of issuance.	Renewed for 5 years if county superintendent is satisfied of holder's fitness to teach and govern.

certificates in the various States—Continued.

MARYLAND.

[The Public School Laws of 1910, pp. 12, 24, 26, 31-32. By-Laws, Rules, and Regulations of the Public School System of Maryland, 1908, pp. 18-21.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
7 years, 5 in Maryland.			Holder of first-class certificate; unanimous recommendation of county board of school commissioners; satisfactory proof of liberal education and professional study, equivalent to graduation from some reputable college.
.....do.....	State superintendent subject to approval of State board.	State superintendent.	Same as above; board of education may require any applicant to pass a satisfactory examination.
1 year.....	No examination required.....		Graduation from a State normal school of Maryland or of the normal department of Washington College.
None.....	do.....		None specified. (No longer issued.)
Varies; left to judgment of State superintendent.	do.....		Graduation from approved higher institution in Maryland, including completion of 2 years' professional course prescribed by State board of education.
None.....	County superintendent.	County superintendent.	(Examination for first grade same as that for second grade except the omission of the history of Maryland and the addition of bookkeeping, algebra (without limitations), natural philosophy, plane geometry (4 books), and general history. Examination for second grade in orthography, reading, writing, arithmetic, geography, United States history, history of Maryland, grammar, Constitutions of United States and Maryland, algebra (to quadratics), theory and practice of teaching, physiology, and laws and by-laws of the public school system of Maryland. The grade of certificate is determined by the scholastic qualifications as shown in the examination. The class of certificate under each grade is determined by a consideration of the (a) scholarship, (b) executive ability, (c) personality, and (d) teaching power of the applicant, and of such other points as the State board of education may approve.

TABLE 1.—*The principal features of teachers'*
MASSACHUSETTS.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Union superintendent's certificate.	State board of education.	State.....	Superintendent...	From 1 to 5 years.	A pleasure of board; may be renewed if record is satisfactory.
Local certificates...	School committee.	Town.....	.....	1 year, usually.	Very variable practice.

MICHIGAN.

[School Laws, 1909, secs. 59, 165, 177, 287, 301, 334. Public Acts of Michigan, 1903, ch. 213; 1905, chs. 24, 148; 1907, chs. 112, 125; 1909, ch. 165; 1911, chs. 20, 146.]

University of Michigan certificate.	Regents of university.	State.....	Any.....	Life.....	.....
State life certificate.	State board of education.	do.....	do.....	do.....	.....
College certificate.	do.....	do.....	do.....	4 years.....	Renewable for life after 3 years' experience.
Advanced State Normal College, Central Normal, Northern Normal, or Western Normal certificate.	do.....	do.....	do.....	Life.....	.....
Central Normal and Western Normal advanced rural certificate.	do.....	do.....	In rural schools...	5 years.....	Renewable for 3 years after 5 years' teaching.
State Normal College, Central Normal, Northern Normal, or Western Normal graded certificate.	do.....	do.....	In grades.....	3 years.....	Renewable for 3 years after 3 years' teaching.
State Normal College, Central Normal, Northern Normal, or Western Normal elementary rural school certificate.	do.....	do.....	In rural schools...	do.....	do.....
Certificate of teacher of agriculture.	State board of agriculture.	do.....	Any.....	do.....	Nonrenewable

¹ As determined by State board of education.

² Qualifications of certain superintendents of schools determined by the State board of education.

³ As determined by school committee.

⁴ SEC. 28. It [The school committee] shall select and contract with the teachers of the public schools, shall require full and satisfactory evidence of their moral character, and shall ascertain by personal examination their qualifications for teaching and their capacity for the government of schools; or in lieu thereof, may accept the diplomas granted by the State normal schools of this Commonwealth to their graduates.

SEC. 29. Every teacher shall, before he opens any public school, obtain from the school committee a certificate, in duplicate, of his qualifications, one of which shall be deposited with the selectmen, or, in a city, with the auditor or treasurer or with any officer who may be prescribed on the charter, before any payment is made to him on account of his services. (Mass. School Laws, 1909, p. 24.)

The authority and duty of the school committee of a town are not confined to ascertaining by examination the literary qualifications of teachers and their capacity for the government of schools, but they are the sole judges of their qualifications in all respects to teach and govern the schools for which they are selected. (9 Allen, 94.)

The school committee have the whole power to examine teachers. (Bachelder v. City of Salem, 4 Cush., 599.)

certificates in the various States—Continued.

MASSACHUSETTS.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
(1)	(1)	(1)	See footnote 2.
(2)	(2)	(2)	See footnote 4.

MICHIGAN.

[School Laws, 1909, secs. 59, 165, 177, 287, 301, 334. Public Acts of Michigan, 1903, ch. 213, 1905, chs. 24, 148; 1907, chs. 112, 125; 1909, ch. 165; 1911, ch. 20.]

None	No examination required		Possession of bachelor's, master's or doctor's degree, and also a teacher's diploma for work done in the science and the art of teaching in the university or in equal institution.
2 years	State board of education.	State board of education.	Eminent scholarship and ability shown by examinations in every study required for such certificate. ⁵
None	No examination required		Possession of bachelor's, master's or doctor's degree of approved college, with at least a 1-year course in science and art of teaching and observation of actual school work.
.....do.....	do.....		Two years' normal course after 4 years' high school or 4 years' course after tenth grade.
.....do.....	do.....		Two years' normal work in advance of elementary rural course.
.....do.....	do.....		One year's normal work after 4 years' high school.
.....do.....	do.....		Two years' normal work and 1 term if no high-school credits.
.....do.....	do.....		Graduation from 4-year course in agriculture in the Michigan Agricultural College, with a course of at least a half year in pedagogy.

The committee are to find such teachers [good teachers] by examination. The most satisfactory examination will be made by observing a teacher at his work. If this can not be done, the candidate may be examined by questions which shall test his ability to teach the branches of learning to be pursued in the schools, also his ability to organize and control a school. [Note in Mass. School Law, 1892, p. 42, and repeated for several years.]

Chapter 215, acts of 1904, provides as follows:

In all the superintendency unions in which any part of the expense of the superintendent is borne by the Commonwealth the State board of education shall determine, by examination or otherwise, the qualifications of candidates for the position of superintendent of public schools; and, after the first day of January, in the year nineteen hundred and five, no person shall be elected to such position who does not hold a certificate of fitness and competency from said board: *Provided, however,* That this act shall not apply to any superintendency union in which one town does not receive aid from the Commonwealth for expense of a superintendent until the termination of the contract, if any, existing between such towns at the time of the passage of this act.

⁵ Algebra, botany, United States history, civil government, arithmetic, literature, chemistry, general history, geography, geology, Latin, geometry, orthography, theory and art of teaching, rhetoric, zoology, German, English grammar, school law, penmanship, physiology, and physics.

TABLE 1.—*The principal features of teachers'***MICHIGAN**—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Kindergarten teachers' certificate.	State superintendent.	State	Kindergarten and first grade.	Life.....	.....
Certificate for teachers of music or drawing.	do.....	do.....	Subject named.....	do.....	.....
First-grade county certificate.	County board of examiners.	County (State, if countersigned by State superintendent).	Any.....	4 years.....	Renewable if average is above 85 per cent in 2 examinations, and continuous teaching.
Second-grade county certificate.	do.....	County ¹	do.....	3 years.....	do.....
Third-grade county certificate: Class A.....	do.....	do.....	Primary department.	1 year.....	do.....
Class B.....	do.....	do.....	Any.....	do.....	⁽²⁾ Renewable, option of county normal board for 3 years..
County normal training class diploma.	County normal board.	do.....	Any school having not over 2 teachers.	do.....	
County special certificate.	County commissioner.	Specified district.	.....	Until next public examination.	Nonrenewable.
Local certificates ³.....	.....	.....	.....	.....	.....

MINNESOTA.

[School Laws of Minnesota, 1907, pp. 113-119. Laws of Minnesota, 1909, ch. 455. Circular of information, relating to examinations, etc., department of public instruction, 1908.

First-grade professional certificate: Upon examination.	State superintendent.	State.....	Any.....	Limited number of years at first. For life after 10 years' successful teaching.	See duration..
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¹ Examination papers may be sent to another county on request of applicant; new certificates may be issued thereon; valid in the other county for life of original certificate.

² Without examination, if average is above 85 per cent in 2 examinations, and continuous teaching; not more than 3 to same person.

certificates in the various States—Continued.

MICHIGAN—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	No examination required		Graudation from approved kindergarten training school and possession of a teacher's certificate, or diploma from a college or a high school with a 4-year course.
.....do.....	No examination required		Completion of at least 2 years' course in music in State university, a State normal school, or an incorporated college; or completion of at least 1-year course in drawing in same or equal institution.
1 year.....	State superintendent.	County board of school examiners.	Examination in orthography, reading, writing, grammar, geography, arithmetic, theory and art of teaching, United States history, civil government, physiology and hygiene, school law, State course of study for district schools, physics, general history, botany, and algebra.
7 months.....	do.....	do.....	Examination in subjects required for third-grade certificate, and in addition two of the following: General history, botany, physics, and algebra.
3 years in primary department of graded schools.	do.....	do.....	Examination in writing, orthography reading, grammar, arithmetic, geography, United States history, civil government, theory and art of teaching, physiology and hygiene, with special reference to the effect upon the human system of alcoholic drinks, stimulants, narcotics, school law, State course of study for district schools, and the causes and prevention of dangerous communicable diseases.
None.....	do.....	do.....	Same as for third grade, Class A.
.....do.....	No examination required.....		Graduation from county normal training class (1-year course).
.....do.....	County commissioner.	County commissioner.	Personal examination by county commissioner in third-grade branches.

MINNESOTA.

[School Laws of Minnesota, 1907, pp. 113-119. Laws of Minnesota, 1909, ch. 455. Circular of information, relating to examinations, etc.; department of public instruction, 1908.]

Permanent teachers of successful experience, including 9 months in Minnesota.	State superintendent.	State superintendent.	Examination in the branches required for a first-grade certificate; also all the branches included in subdivision 1 (following); 2 in subdivision 3; 2 in subdivision 4; and 3 in each of the other subdivisions, namely: (1) Educational science, including history of education, psychology, general pedagogy, and school organization; (2) mathematics, including higher algebra, solid geometry, trigonometry, plane and spherical; (3) English, including English and American literature and rhetoric; (4) history, ancient, medieval, English, and American; (5) science, including botany, chemistry, geology, and physiography, astronomy, zoology, and political science.
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³ "In incorporated cities employing a principal of the high school and also a superintendent of schools who gives not less than one-third of his or her time to school supervision, the superintendent of schools and the board of education or a committee thereof shall be empowered to examine their teachers and grant certificates to such as are not already legally qualified, at such times and in such form as the superintendent of public instruction shall prescribe." (Public Acts, 1911, No. 146.)

TABLE 1.—*The principal features of teachers'*
MINNESOTA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
First-grade professional certificate—Contd. Without examination.	President of university and State superintendent.	State	Any	Life or 2 years.	.....
Second-grade professional certificate.	State superintendent.	do.....	Elementary grades	Same as first-grade professional.	See duration..
Professional permit.	do.....	do.....	Same as corresponding professional certificate.	1 year.....	Nonrenewable
First-grade certificate: Upon diploma....	President of school and State superintendent.	do.....	Elementary grades	2 years.....	Renewable for life on 2 years' teaching.
Upon normal elementary diploma.	State normal board	do.....	do.....	3 years.....	Renewable 3 years; completion of additional year in State normal school.
Upon examination.	State and county superintendent.	do.....	do.....	5 years.....	Conditions of renewal prescribed by State superintendent.
Second-grade certificate. ²	do.....	County; in other counties when indorsed.	do.....	2 years.....	do.....
Limited second-grade certificate.	do.....	do.....	do.....	1 year.....	Renewable 5 months' experience; all grades above 70 per cent.
Third-grade certificate.	County superintendent.	District specified.	do.....	do.....	Reissued upon examination. ³
Special certificates..	State superintendent.	State.....	Branches named..	Term of years or life.	Limited (2 years). ⁴

MISSISSIPPI.

[School Laws of Mississippi, 1906, pp. 20-26, Acts of 1908, Chap. 201.]

Professional license.	State board of education.	State.....	Any.....	Life.....	
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¹ Laws, p. 114, sec. 272. The written answers for the scholastic examination shall be read and marked under the direction of the State superintendent. Markings for the professional requirements shall be given by the county superintendent, who shall also be the judge of skill in teaching and moral character of applicants. (1351.)

Superintendents of public instruction may limit first and second grade teachers' certificates to 1 year in certain instances. (Douglas, Aug. 24, 1899.)

certificates in the various States—Continued.

MINNESOTA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
2 years for life certificate; none for 2-year certificate.	No examination required.....		Graduation from University of Minnesota from its college of education or from college of science, literature, and art, or from college of agriculture, including specified courses in college of education.
Same as first-grade professional.	State superintendent.	State superintendent.	Examination in all branches included in examination for first-grade certificate in subdivision 1 (above) and in 6 branches included in the other subdivisions.
.....do.....	do.....	do.....	Teachers lacking not more than 3 of the branches required for a professional certificate.
None.....	No examination required.....		Graduation from State normal school or of the teachers' course in the department of agriculture in the State university.
.....do.....	No examination required.....		Completion of course in a Minnesota State normal school prescribed for elementary diploma.
8 months.....	State superintendent.	State superintendent. ¹	Examination in reading, spelling, arithmetic, grammar, United States history, composition, geography, physiology, civil government, and practical hygiene; also algebra, geometry, physical geography, and physics. Other branches may be substituted by State superintendent for the last 3. Music, drawing, and languages are optional.
5 months.....	do.....	do.....	Examination in reading, spelling, writing, arithmetic, grammar, United States history, composition, geography, physiology, civil government, and practical hygiene.
None.....	do.....	do.....	Do.
.....do.....	County superintendent.	County superintendent.	Do.
2 years for life certificate.	State superintendent.	State superintendent.	Examination in branches to be taught, with those required for a second-grade certificate.

MISSISSIPPI.

[School Laws of Mississippi, 1906, pp. 20-26, Acts of 1908, Chap. 201.]

Varies.....	State board of examiners.	State board of examiners.	To teachers of recognized ability, moral character, and scholarly attainments who shall pass a satisfactory written examination in algebra, physics, geometry, rhetoric, English literature, botany, chemistry, science of teaching, civil government, Cæsar and Virgil.
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² Certificates showing completion of 2 years' prescribed work in State normal schools may be indorsed by State superintendent, giving them the effect of second-grade certificates.

³ Not more than 2 certificates to same person in same county.

⁴ Certificate may be renewed after 2 years' successful experience.

TABLE 1.—*The principal features of teachers'***MISSISSIPPI**—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
State license.....	State board of examiners.	State	Any	1, 2, or 3 years, according to standing.	May be renewed by reexamination. Holder of second 3 years' license exempt from further examination.
First-grade license..	County board of examiners.	County.....	do.....	1, 2, or 3 years. See last column.	Second 3 years' license renewable so long as holder continues to teach.
Second-grade license.	do.....	do.....	do.....	1 year.....	Nonrenewable.
Third-grade license.	do.....	do.....	do.....	do.....	do.....
Transfer license....	State board of examiners.	County designated by applicant.	do.....	Unexpired time of original.	Same as for original license.

MISSOURI.

[Rev. School Laws of Missouri, 1911, secs. 10920, 10939-10948, 11073. Laws 1911, S. B. 240. Circular of Dept. of Ed., "Requirements for State certificates, 1910."]

Life State certificate: Upon examination.	State superintendent.	State.....	All public schools of State.	Life.....	.....
Upon diploma..	do.....	do.....	do.....	do.....	.....
Missouri normal diploma.	Board of regents...	do.....	do.....	do.....	.....

certificates in the various States—Continued.

MISSISSIPPI—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
Varies.....	State board of examination.	State board of examination.	Subjects required for first-grade certificate.
None for 1 year; 6 months for 2 and 3 year certificate.	State superintendent.	County board of examiners.	Examination in subjects required for second-grade certificate, except no examinations are "elementary," and also in history of Mississippi, agriculture, and civil government, with minimum average of 75 per cent and grade of 50 per cent for 1-year certificate; minimum average of 85 per cent for 2-year certificate; and 90 per cent for 3-year certificate.
None.....	do.....	do.....	Examination in spelling, reading, mental arithmetic, practical arithmetic, elementary geography, elementary English, grammar and composition, primary United States history, primary physiology and hygiene, with special reference to the effects of narcotics and stimulants, with a minimum average of 75 per cent and grade of 50 per cent.
do.....	do.....	do.....	Same as for second grade, except minimum average of 60 per cent and grade of 40 per cent.
do.....	See scholarship requirements.	State board of examiners.	Holder of any license may direct a county superintendent to forward his papers and license to State board of examiners. If grading of county board is sustained, the transfer license is issued.

MISSOURI.

[Rev. School Laws of Missouri, 1911, secs. 10920, 10939-10948, 11073. See p. 56. Circular of Dept. of Ed., "Requirements for State certificates, 1910."]

40 months.....	State superintendent.	State superintendent.	The same as 5-year limited certificate, and in addition history of education, psychology, and a thorough examination along some special line of educational or pedagogical work, as mathematics, English history, foreign languages, or science.
do.....	do.....	do.....	Graduation from an institution holding membership in the "Missouri College Union" or an institution of equal rank, and examination in history of education, and two of the following: Primary teaching and kindergarten, grade and rural teaching, supervision, Missouri school system.
10 months in training school.	No examination required.....		Completion of advanced course, which admits to junior year in the university.

TABLE 1.—*The principal features of teachers'*

MISSOURI—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Limited State certificate: Upon examination.	State superintendent.	State	All public schools of State.	5 years	Renewable....
Upon diploma....	do.....	do.....	do.....	do.....	do.....
Missouri normal certificate.	Board of regents...	do.....	do.....	2 years	Nonrenewable
First-grade county certificate.	County superintendent.	State.....	do.....	3 years	Renewable unlimited number of times, provided holder completes required professional work or, having 5 years' experience, continues in same position.
Second-grade county certificate.	do.....	County, may be indorsed in other counties.	do.....	2 years	Once only....
Third-grade county certificate.	do.....	do.....	do.....	1 year	Reissued upon examination only during 4 consecutive years.
Special county certificate.	do.....	do.....	do.....	Until next regular examination.	Nonrenewable.

¹ The county superintendent is required to grade all applicants who have had 4 months' experience on (1) teaching ability and (2) management. The minimum grade requirements apply to their professional qualities as well. (See also note ².)

Grades made in the summer terms of State educational institutions and in such other schools as may be approved by the State board of education, when obtained under conditions prescribed by the State board, shall be accepted by State and county superintendents in lieu of examination.

Grades given by the State superintendent on county certificates are valid throughout the State

certificates in the various States—Continued.

MISSOURI—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
12 months.....	State superintendent.	State superintendent.	Examination in same branches as for second-grade county certificate and one branch of each of following divisions: (1) ancient history, mediæval and modern history, English history and government, American history and government, general economic history; (2) rhetoric, history of English language, history of American and English literature, Latin (Cæsar and Cicero), German (2 years); (3) biology, botany, zoology, physical geography, geology; (4) physics, chemistry, higher algebra, plane and solid geometry, manual training; (5) primary teaching and kindergarten, grade and rural teaching, supervision, Missouri school system. ¹
.....do.....	do.....	do.....	Graduation from an institution holding membership in the "Missouri College Union" or an institution of equal rank and examination in pedagogy, psychology, and four common-school branches to be selected by examiner.
5 months in training school.	No examination required.....		Course of study, elementary pedagogy, academic, equal to 2 years in high school.
8 months.....	State superintendent.	State superintendent.	Examination in same branches as for second-grade county certificate, with addition of one division of history, either ancient, mediæval, modern, or English, and one branch of science, either physical geography, elementary physics or elementary biology. ^{1,2} Minimum average of 90 per cent.
None.....	do.....	County or State superintendent.	Examination in same branches as third-grade county certificate, with addition of algebra and literature. ^{1,2} Minimum average of 85 per cent.
.....do.....	do.....	do.....	Examination in spelling, reading in English, penmanship, language lessons, geography, arithmetic, English grammar, United States history, civil government (including State government), physiology and hygiene, pedagogy, elementary agriculture. ^{1,2} Minimum average of 80 per cent with no branch below 60 per cent.
.....do.....	County superintendent.	County superintendent.	Same as for third-grade county certificate.

² Completion of various years of classified or accredited high schools or their equivalent required of applicants for first and second grade certificate after various years, as follows: From and after Sept. 1, 1914, 2 years; from and after Sept. 1, 1916, 3 years; from and after Sept. 1, 1918, 4 years.

The work may be done in any public, private, or parochial school or by private study. These requirements do not apply to those holding certificates on Jan. 1, 1912.

TABLE 1.—*The principal features of teachers'***MONTANA.**

[School Laws of Montana, 1909, pp. 15, 16, 21, 132-138. Acts of 1911, H. B. No. 87.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Life diploma: Upon examination.	State board of education.	State.....	Any.....	Life.....	
Without examination.	do.....	do.....	do.....	do.....	
State certificate: Upon examination.	do.....	do.....	do.....	6 years.....	Renewable....
Without examination.	do.....	do.....	do.....	do.....	do.....
University diploma.	do.....	do.....	do.....	5 years.....	Renewable for life after teaching in high schools 27 months.
Temporary State certificate.	State superintendent.	do.....	do.....	Until meeting of State board of education.	
Normal school diploma.	State board of education.	do.....	do.....	3 years.....	Life diploma granted graduate of 4-year course after 1 year's ex- perience; graduate of 3-year course after 2 years' ex- perience.
Professional certificate.	County board of examiners.	County; valid in any other county upon in- dorse- ment.	do.....	Not less than 4 years.	10 months under certificate; renew- able as long as holder continues teaching and gives county su- perintendent satisfac- tory evi- dence of progress and efficiency.
First-grade certificate.	do.....	do.....	Any, except in high schools and as principal of school of more than two de- partments un- less holder is a graduate of a reputable col- lege, university, or normal school.	Not less than 3 years.	do.....
Second-grade certificate.	do.....	County.....	do.....	2 years.....	Renewable....

certificates in the various States—Continued.

MONTANA.

[School Laws of Montana, 1909, pp. 21, 132-138. Acts of 1911, H. B. No. 87.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
10 years of not less than 7 months each, of which 21 months were in public schools of Montana. See scholarship requirements.	Superintendent of public instruction.	.....	Examination in subjects required for a professional county certificate and, in addition, in rhetoric, botany, zoology, geology, general history, political economy, and English literature.
5 years of not less than 7 months each, of which 21 months were in public schools of Montana.	Superintendent of public instruction.	.....	(1) Holder of State certificate or Montana normal school diploma. Five years' experience in State required of former, 1 or 2 years of latter. (2) Graduate of University of Montana holding a university certificate of qualification to teach, and having taught in high schools 27 months.
18 months since graduation.	.....	.....	Examination in subjects required for a professional county certificate with the addition of English literature and psychology.
None.....	No examination required.....	.....	Graduation from a reputable college, university, or normal school in advanced course, and a resident teacher of Montana. Registration of University of Montana diploma and university certificate of qualification to teach, in the office of the State superintendent.
See scholarship requirements.	.....	.....	Qualifications must warrant the granting of a State certificate.
None.....	No examination required.....	.....	Graduation from either 3 or 4 year course of Montana State Normal School.
12 months.....	State superintendent.	County board of examiners.	Examination in subjects required for first-grade certificate and, in addition, in physics and plane geometry.
.....do.....	do.....	do.....	Examination in subjects required for second-grade certificate and, in addition, in American literature and elementary algebra.
None.....	do.....	do.....	Examination in subjects required for third-grade certificate and, in addition, in civics of United States and Montana, and physical geography.

TABLE 1.—*The principal features of teachers'***MONTANA**—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Third-grade certificate.	County board of examiners.	County	Any, except in high schools and as principal of school of more than two departments unless holder is a graduate of a reputable college, university, or normal school.	1 year.....	Reissued not more than once to same person.
Special certificate (penmanship, drawing, modern language and music, elocution, physical training, commercial branches, manual training, domestic science, kindergarten, first primary).	do.....	District....	Special branches named.	3 years.....	Renewable. No definite conditions specified.
Temporary certificate.	do.....	County.....	Same as first grade.	Until next examination.	Issued not more than once to same person except in emergency.

NEBRASKA.¹

[School Laws, 1909, pp. 70-81, 91, 102. Laws of Nebraska, 1897, chap. 65; 1905, chap. 135; 1907, chap. 123 Acts of 1911, chap. 120.]

Professional State certificate: Upon examination.	State superintendent.	State.....	Any.....	Life.....	.....
Upon diploma.....	do.....	do.....	do.....	do.....	.....
Do.....	do.....	do.....	do.....	do.....	.....
Nebraska State normal life diploma.	Board of education of State normal schools.	do.....	do.....	do.....	.....
College or university permanent certificate.	State superintendent.	do.....	do.....	do.....	.....
State normal school diploma.	Board of education of State normal schools.	do.....	do.....	3 years.....	.....

¹ See appendix for revised scheme of certification as submitted by J. W. Crabtree, superintendent of public instruction.

certificates in the various States—Continued.

MONTANA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	State superintendent.	County board of examiners.	Examination in penmanship, orthography, reading, writing, arithmetic, mental arithmetic, geography, grammar, United States history, and theory and practice of teaching. Minimum standing for each county certificate is fixed by State superintendent.
.....do.....	No examination required.....		Issued upon the request of a majority of any local board.
.....do.....	No examination required.....		Applicant must give satisfactory reasons for not attending previous regular examination.

NEBRASKA.

[School Laws, 1909, pp. 70–81, 91, 102. Laws of Nebraska, 1897, chap. 65; 1905, chap. 135; 1907, chap. 123; Acts of 1911, Senate file, No. 300.]

1 year in State....	State superintendent.	State superintendent.	Possession of Nebraska first-grade county certificate, and examination in chemistry, English literature, general history, geology, physical geography, plane trigonometry, psychology, rhetoric, and zoology.
3 years in State....	.....	.....	Diploma from approved college or university, and possession of Nebraska first-grade county certificate.
2 years.....	.....	.....	Diploma from advanced course of a State normal school of another State conferring the right to teach for life in said State.
2 years after graduation or 3 years before or partly before and partly after.	.....	.....	Completion of the higher course of study in a State normal school.
3 years.....	.....	.....	Graduate of University of Nebraska or institution in Nebraska approved by the State superintendent on the basis of the University of Nebraska holding degree of A. B. or B. S. and certificate showing completion of course of instruction for special training of teachers; or the completion of a course of study equal in extent and similar in subjects to the advanced course of the Nebraska State normal schools in a Nebraska institution approved by the State superintendent on the basis of the State normal schools.
None.....	.....	.....	Completion of higher course of State normal school.

TABLE 1.—*The principal features of teachers'***NEBRASKA**—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence
		Territory.	Schools.		
College, university, or normal school first-grade State certificate.	Board of trustees of institution and State superintendent.	State	Any	3 years.....	May be extended by State superintendent.
College or university first-grade State certificate.	Board of trustees of institution.	do.....	do.....	do.....	do.....
Elementary State certificate.	Board of education of the State normal schools.	do.....	Common school districts and grades of high school and city districts.	1 to 3 years (discretion of county superintendent).	do.....
College or university second-grade State certificate.	Board of trustees of institution and State superintendent.	do.....	do.....	do.....	do.....
City certificates supervisor's, high school, grammar, (special primary, and kindergarten grades). First-grade county certificate: Upon examination.	State superintendent.	do.....	City schools.....	(1)	(1)
Without examination.	County superintendent. ¹	County.....	Any except in city districts.	2 to 3 years..	Renewable at the discretion of the county superintendent, subject to the rules and regulations of the State superintendent.
Second-grade county certificate.	do.....	do.....	do.....	do.....	do.....
Third-grade county certificate.	do.....	do.....	do.....	1 to 2 years..	(3)
Permit.....	do.....	do.....	do.....	Not over 1 year.	Not reissued..
Emergency certificate.	do.....	do.....	do.....	Term of school.	do.....
	do.....	do.....	do.....	Until results of next regular examination are learned.	Granted only once in any county to same person.

¹ City certificates shall be granted as State certificates under rules prescribed by the State superintendent of public instruction. Such rules shall set forth the standards for each class and fix the minimum requirements of same.

certificates in the various States—Continued.

NEBRASKA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None			Completion of course of study equal in extent and similar in subjects to higher course of State normal schools, in a Nebraska institution approved by the State superintendent on basis of State normal schools.
do			Graduate of University of Nebraska or institution in Nebraska approved by the State superintendent on the basis of the University of Nebraska with the degree of A. B. or B. S. and completion of course for special training of teachers.
do			Completion of elementary course in State normal school of Nebraska.
do			Completion of course of study equal in extent and similar in subjects to elementary course of State normal schools, in a Nebraska institution approved by the State superintendent on the basis of the State normal schools.
(1)	(1)	(1)	For a city certificate of supervisor's or high school grade, requirements must not be less than the equivalent of a first-grade State certificate; for other grades, not less than for a second-grade county certificate. ¹
1 year or 12 weeks normal training.	State superintendent.	State superintendent.	Same as second-grade county certificate with examination in algebra, botany, geometry, and physics; or graduation from standard college, university, or State normal school.
1 year (or 8 weeks normal training).	do	do	Graduation from a college, university, or State normal school, and meeting the requirements of the State superintendent.
None	do	do	Same as third-grade county certificate, with examination in civil government, bookkeeping, drawing, theory and art of teaching, and elementary agriculture.
do	do	do	Examination in orthography, reading penmanship, geography, arithmetic, mental arithmetic, physiology and hygiene, English composition, English grammar and United States history.
do	do	do	Granted on recommendation of county superintendent. Applicant must attend teachers' examinations and write upon such subjects as county superintendent may direct.
do	do	do	Evidence of ability to secure passing grades in all subjects required for certificate sought.

¹ Papers are graded by the State superintendent. The county superintendent issues the certificate upon the standings sent him by the State superintendent, provided he "has satisfactory evidence that the candidate is a person of good moral character, has had successful experience, if any, and possesses aptness to teach and govern a school." (School Laws, 1909, p. 76.)

² If average 85 per cent and no grade below 80 per cent may be reissued without examination upon recommendation of county superintendent.

TABLE 1.—*The principal features of teachers'*

NEVADA.

[School Law, 1909, pp. 14-21. Laws of Nevada, 1907, chap. 182, p. 378. Laws 1911, chap. 133.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Life diploma (high-school elementary, special).	State board of education.	State.....	Any.....	Life.....	.....
High-school certificate: Upon examination.	do.....	do.....	do.....	4 years.....	Renewed at discretion of State board.
Without examination.	do.....	do.....	do.....	5 years.....	do.....
Elementary school certificate: First-grade— Upon examination.	do.....	do.....	Elementary schools.	3 years.....	do.....
Without examination.	do.....	do.....	do.....	5 years.....	do.....
Second grade.....	do.....	do.....	do.....	2 years.....	Nonrenewable.
Elementary school certificate. Third grade.	do.....	School in which applicant is teaching.	Elementary schools.	Until next examination.	Issued only once to same person.
Special certificate (music, drawing, manual training, commercial subjects, kindergarten, foreign languages).	do.....	do.....	Subjects named...	2 years.....	Renewable for 2 years if holder continues teaching.
Temporary certificate.	Deputy superintendent.	School district.	Any.....	Until next examination.	Nonrenewable.

certificates in the various States—Continued.

NEVADA.

[School Law, 1909, pp. 14-21. Laws of Nevada, 1907, chap. 182, p. 378. Laws 1911, chap. 133.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
(1) 72 months in State, or 36 in State; (2) 45 months for graduates of State normal school.			(1) Evidence of having taught successfully and continuously in public schools of State for 72 months, or (2) graduate of State normal school and holder of high-school or grammar-school certificate who has had 45 months' experience; life diploma of same grade as certificate.
None.....	State board of education.	Board of educational examiners.	Examination in English grammar, spelling, arithmetic, English literature, general history, history of the United States, civil government, algebra, plane geometry, physics, history and methods of teaching; one of the following languages: Latin, French, German, or Spanish; and any three of the following: Rhetoric, English history, solid geometry, physical geography, chemistry, botany, and zoology.
.....do.....			Graduation from State normal school, advanced course.
16 months.....	State board of education.	Board of educational examiners.	Examination in spelling, reading, writing, English grammar, mental arithmetic, written arithmetic, physiology and hygiene, history of the United States, geography, general history, drawing, music, business forms, and theory and methods of teaching.
None.....			Graduation from elementary course in State normal school.
.....do.....	State board of education.	Board of educational examiners.	Examination in subjects required for first grade elementary certificate. Minimum average, 75 per cent; minimum grade, 60 per cent.
.....do.....	do.....	do.....	Granted only to those who have taken the December examination and are at that time engaged in teaching, at discretion of board.
.....do.....	do.....	do.....	Board shall determine fitness of applicant to teach special subject by whatever method it considers most appropriate. May be granted to teach music, drawing, manual training, penmanship, kindergarten work, or any foreign language.
.....do.....			Board of school trustees must request. Certificate will not be granted if any member of board is a near relative of applicant.

TABLE 1.—*The principal features of teachers'*

NEW HAMPSHIRE.

[Laws of New Hampshire, relating to public schools, pp. 34, 41-42. Abstract of regulations governing State examination and certification (no date).]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Supervisory certificate.	State superintendent.	State.....	Any.....	Life.....	
High school certificate: Permanent.....	do.....	do.....	High schools.....	do.....	
Probationary.....	do.....	do.....	do.....	1 year.....	Permanent certificate issued upon completion of examinations.
Elementary certificate: Permanent— Upon examination.	do.....	do.....	Elementary.....	Life.....	
Without examination.	do.....	do.....	do.....	do.....	
Probationary.....	do.....	Has never been determined.	do.....	1 year.....	Has never been determined.
Local certificates ³	School board.....	District.....	Branches named.....	do.....	None.....

¹ An average of not lower than 90 per cent and no subject below 80 per cent entitles applicant to a certificate "with credit." An average of not lower than 95 per cent and no subject below 90 per cent entitles applicant to a certificate "with honor."

² *Group I.*—History of education, psychology, pedagogy, school law, school management, with special reference to the problems of the adolescent period.

Group II.—English literature, including American authors; grammar; rhetoric; composition; either Latin, Greek, French, or German; either physics, chemistry, or biology; algebra, through quadratics; plane geometry; United States history; either Grecian and Roman, mediæval and modern, or English history; and civil government.

certificates in the various States—Continued.

NEW HAMPSHIRE.

[Laws of New Hampshire, relating to public schools, pp. 34, 41–42. Abstract of regulations governing State examination and certification (no date).]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
2 years.....	State superintendent.	State superintendent.	Examination in history of education, school management, psychology, pedagogy, school organization and supervision, school law; and graduation from approved college or equivalent. ¹
None.....	do.....	do.....	(1) Graduation from approved college, certificate of college standing in advance courses of subjects in Group III and examination in Group I, with minimum average of 75 per cent and grade of 55 per cent; (2) or satisfactory evidence of adequate education, and examination in Groups I, II, and III, with same minimum standings. ²
do.....	do.....	do.....	Same as for permanent certificate except minimum average of 70 per cent and minimum grade of 50 per cent, and omission of Group III from subjects of examination.
do.....	do.....	do.....	(1) Graduation from approved high school or academy in New Hampshire and examination in Group I (same standings as under (2)) or (2) examination in Groups I and II, with minimum average of 75 per cent and grade of 55 per cent. <i>Group I.</i> —Psychology, pedagogy, school management, school law. <i>Group II.</i> —English literature, grammar, composition, spelling, United States history, civil government, oral and written arithmetic, physiology and hygiene, and geography. ¹
do.....	No additional examination required...		Graduation from a State normal school of New Hampshire (full course).
do.....	State superintendent.	State superintendent.	Same as for permanent except minimum average of 70 per cent and minimum grade of 50 per cent and the further provision that certificates of standing in professional subjects in teacher's course in a State normal school are accepted in lieu of examination in Group I.
do.....	School board.....	School board.....	Examination in studies prescribed by law—physiology and hygiene with special reference to effects of alcoholic stimulants and of narcotics, humane treatment of lower animals, United States and New Hampshire Constitutions—and by school board for particular school or grade in which teacher desires to teach.

Group III.—Examination to test special proficiency in one of following departments of study: The English language and literature, the Greek and Latin languages and literatures, the French and German languages and literatures, history, chemistry and physics, biology, mathematics, and commerce.

³ The superintendent of public instruction may issue, without the requirement of examination, a certificate of qualifications to any person who has served as a teacher in the public schools of the State for a term of three school years when in his judgment the educational interests of the State will be served by such action. (Act of Apr. 14, 1911.)

TABLE 1.—*The principal features of teachers'*
NEW JERSEY.

[Rules of the State board of education, adopted April, 1911.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Supervisor's certificate:					
Permanent.....	State board of examiners.	State.....	Any, as supervisor or principal, or teacher of any branch covered by certificate.	Life.....	
Limited.....	do.....	do.....	do.....	Not given.....	
Secondary State certificate:					
Permanent.....	do.....	do.....	Any, in branches named.	Life.....	
Limited.....	do.....	do.....	do.....	1 year.....	Renewable for 2 years.
Elementary State certificate:					
Permanent.....	do.....	do.....	Elementary.....	Life.....	
Limited.....	do.....	do.....	do.....	1 year.....	Renewable for 2 years.

¹ No grade may fall below 70 per cent.

In lieu of an examination the State board may accept (1) the diploma of any approved college for the subjects it covers; (2) the diploma of a State normal school of another State; (3) a permanent State certificate granted in another State on examination, provided that such normal-school diploma or State certificate covers work equivalent to the requirements in this State for the grade of certificate for which application is made.

Records from approved universities, colleges, or summer schools of the completion of a course of study in any professional subject required for any grade of certificate may be accepted in lieu of examination in such subject, provided the record of the same be submitted under seal or affidavit of the institution.

Any New Jersey county or State certificate in full force within one year next preceding the date of the examination and any credit heretofore given by any board of examiners shall be accepted in lieu of an examination in the subjects covered.

certificates in the various States—Continued.

NEW JERSEY.

[Rules of the State board of education, adopted April, 1911.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
3 years as supervisor.	No examination required.....		Holder of a limited supervisor's certificate, after 3 years' successful experience as supervisor.
5 years' experience in teaching and 1 year as supervisor of a school employing at least 5 assistant teachers.	State board of examiners.	State board of examiners.	Holder of a New Jersey secondary or elementary certificate, or the equivalent, upon presentation of testimonials of executive ability from the county or the city superintendent and the president, district clerk, or secretary of board of education under which applicant has taught; and examination in school organization. ¹
3 years.....	No examination required.....		Holder of a limited secondary State certificate, after 3 years' successful experience.
None.....	State board of examiners.	State board of examiners.	Holder of a diploma from an approved college or from an approved 4-year high-school teachers' course of a State normal school, or holder of a permanent New Jersey elementary State certificate; and, in addition, examination in psychology, with special reference to teaching, history of education, physiology and hygiene, principles of secondary education, school law, and the subjects to be taught. ¹
3 years.....	do.....	do.....	Holder of a limited elementary State certificate, after 3 years' successful experience and examination in psychology, physical training, manual training, or household economics, theory and practice of teaching, history of education, physics, elementary algebra, school law, and any three of the following: Botany, chemistry, vocal music, zoology, mineralogy, agriculture, plane geometry, astronomy. ¹
None.....	do.....	do.....	Examination in orthography, reading, grammar, composition, literature for the grades, arithmetic, penmanship, business forms, geography, United States history with civics, general history, physiology and hygiene, drawing. After Sept. 1, 1911, applicant must have had 1 year of a course in an "approved" high school; after 1912, 2 years; after 1913, 3 years; after 1914 must be a graduate of such school. ¹

TABLE 1.—*The principal features of teachers'*

NEW JERSEY—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Special State certificates (kindergarten, modern languages, physical training, manual training, cooking, sewing, agriculture, commercial branches, and penmanship): ¹					
Permanent.....	State board of examiners.	State	Branches named..	Life.....	.....
Limited.....	do.....	do.....	do.....	1 year.....	Renewable for 2 years.
Provisional State certificate (any grade).	do.....	City or county.	According to grade of certificate.	Until 15th of month following next regular examination.	(See last column.)
Normal-school certificates:					
Permanent (any grade).	do.....	State.....	Any in branches named.	Life.....	.....
Limited secondary.	do.....	do.....	do.....	1 year.....	Renewable for 2 years.
Limited elementary.	do.....	do.....	Elementary.....	do.....	do.....
Limited special.	do.....	do.....	Branches named..	do.....	do.....
Limited kindergarten-primary certificate.	do.....	do.....	Kindergarten and first 3 primary grades.	do.....	do.....
Permit.....	City or county superintendent.....	City or county issuing.	According to grade of certificate applied for.	30 days.....	Nonrenewable.

¹ Kindergarten includes kindergarten drawing and kindergarten music; drawing includes plane geometry; commercial branches include stenography, typewriting, commercial arithmetic, bookkeeping, commercial law, and economics; manual training includes mechanical drawing; cooking includes household chemistry, physiology, and hygiene; sewing includes dressmaking; penmanship includes penmanship theory and practice, orthography, and English grammar; music includes history of music, methods in music, musical material used in schools; modern languages include psychology, history of education, theory and practice, and school law.

certificates in the various States—Continued.

NEW JERSEY—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
3 years.....	No examination required.....		Holder of a special limited State certificate after 3 years' successful teaching.
None.....	State board of examiners.	State board of examiners.	Examination in subject to be taught. For kindergarten, modern languages, and commercial branches must be a graduate of a 4-year approved high-school course or the equivalent. For a music certificate applicant must also file testimonials from two qualified teachers of music. ²
.....do.....	No examination required (see last column).		Applicant must file with State board the recommendation of the county or the city superintendent having jurisdiction over school applicant desires to teach. Such certificate may be extended until 15th of month following the second regular examination, if applicant must be examined in all branches required for the special grade applied for, provided he shall pass in more than half of subjects specified for said grade of certificate at the first examination, securing at least 70 per cent in each subject and a minimum average of 75 per cent.
2 years.....	No examination required.....		Holder of a limited normal-school certificate of similar grade, after 2 years teaching.
None.....	do.....		A normal certificate for the high-school teachers' course of 4 years shall rank as a secondary certificate for the branches named in certificate.
.....do.....	do.....		A normal certificate for either the 2-year or the 3-year normal course shall rank as an elementary State certificate.
.....do.....	do.....		A certificate for efficient special work in any subject to the extent of two elective units shall rank as a special certificate in that subject.
.....do.....	do.....		A kindergarten-primary certificate issued by a normal school.
.....do.....	do.....		Applicant must file with city or county superintendent a certified copy of an application for a State certificate.

² No grade may fall below 70 per cent.

In lieu of an examination the State board may accept (1) the diploma of any approved college for the subjects it covers; (2) the diploma of a State normal school of another State; (3) a permanent State certificate granted in another State on examination, provided that such normal-school diploma or State certificate covers work equivalent to the requirements in this State for the grade of certificate for which application is made.

Records from approved universities, colleges, or summer schools of the completion of a course of study in any professional subject required for any grade of certificate may be accepted in lieu of examination in such subject, provided the record of the same be submitted under seal or affidavit of the institution.

Any New Jersey county or State certificate in full force within one year next preceding the date of the examination and any credit heretofore given by any board of examiners shall be accepted in lieu of an examination in the subjects covered.

TABLE 1.—*The principal features of teachers'*

NEW MEXICO.

[Acts of 1907, chap. 97, p. 224, and Regulations of Territorial Board of Education in Report of Supt. of Public Instruction for biennium ending June 15, 1908, pp. 21-29.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Professional: Life certificate....	Territorial board of education.	Territory...	Any.....	Life.....	
5-year certificate.....	...do.....	...do.....	...do.....	5 years.....	Renewable for 3 years if holder did not pre- viously hold a pro- fessional 3- year certi- ficate (which see).
3-year certificate.....	...do.....	...do.....	...do.....	3 years.....	Granted 5-year certificate upon com- pletion of 3 years' expe- rience.
Temporary permits	State superintend- ent.	...do.....	...do.....	Until next examina- tion.	Nonrenewable.
First-grade certi- ficate.	Territorial board of education.	...do.....	...do.....	3 years.....	County super- intendent may renew once with- out exami- nation if ap- proved by Territorial superinten- dent.
Second - grade cer- tificate.	...do.....	...do.....	...do.....	2 years.....	Nonrenewable.
Third-grade certi- ficate.	...do.....	...do.....	...do.....	1 year.....	...do.....
Temporary permits	County superin- tendent.	County.....	...do.....	Until next examina- tion.	Not issued twice in succession.
City certificates. ³					

¹ Honorary life certificates may be granted in recognition of scholarship and efficient service in New Mexico public schools to those persons who are unable to furnish transcripts of college records and have served at least 90 months in public schools of New Mexico.

² *Group I.*—Arithmetic review (1), geometry (1), zoology ($\frac{1}{2}$), algebra (1), English grammar review (1), composition and rhetoric (1), history of English literature and English and American classics (2), United States history ($\frac{1}{2}$), civics ($\frac{1}{2}$), general history (1), physiology and hygiene ($\frac{1}{2}$), botany ($\frac{1}{2}$), physical geography ($\frac{1}{2}$), psychology (1), history of education, including a general knowledge of the following school systems: The German, the French, the United States, and the New Mexico [sic] ($\frac{1}{2}$), school management ($\frac{1}{2}$), general method ($\frac{1}{2}$), special method in reading, geography, language, spelling, and primary arithmetic

certificates in the various States—Continued.

NEW MEXICO.

[Acts of 1907, chap. 97, p. 224, and Regulations of Territorial Board of Education in Report of Supt. of Public Instruction for biennium ending June 15, 1908, pp. 21-29.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
5 years.....	Territorial superintendent when examination is required.	Territorial superintendent when examination is required (see last column, No. 2).	(1) Life certificate of another State acceptable to Territorial board of education, or (2) examination in subjects constituting four credits in group II additional to those presented in said group for 5-year certificate and all in group I (see below, 5-year certificate), or (3) satisfactory credits in these subjects. ¹
None if sufficient credits are presented in observation and practice. (See scholarship requirements.)	do.....	do.....	(1) Certificate of another State acceptable to Territorial board of education, or (2) examination in subjects constituting four credits in group II and all in group I, ² or (3) satisfactory credits in these subjects, or (4) holder of 3-year professional certificate with 3 years' experience.
None.....	do.....	do.....	(1) Certificate of another State acceptable to Territorial board of education, (2) examination in subjects constituting four credits in group II and all in group I except last two (substitutions allowed in any subject except the five subjects immediately preceding these last two), or (3) satisfactory credits in these subjects.
.....do.....	do.....	do.....	Holder of credentials deemed sufficient to meet the requirements of the law.
.....do.....	Territorial superintendent, when examination is necessary.	Territorial superintendent, when examination is necessary. (See scholarship requirements.)	(1) Indorsement by Territorial board of unexpired certificate of other States; (2) completion specified courses in specified schools, including graduation from full course at St. Michael's College; (3) presentation of credits in subjects required; or (4) examination in subjects required for second-grade certificate, and, in addition, civil government, elements of pedagogy (more advanced), applied psychology, and one of the following: Algebra, botany, zoology, physics, or bookkeeping, with a minimum average of 90 per cent and grade of 75 per cent.
.....do.....	do.....	do.....	(2) or (3), as above, or examination in subjects required for third-grade certificate, and, in addition, United States history and elementary course in teaching and school management, with an average of 75 per cent and a minimum grade of 50 per cent. (Questions of higher standard than presented for third grade.)
.....do.....	do.....	do.....	Examination in reading, penmanship, orthography, English grammar and composition, geography, physiology, and arithmetic Percentages not named—lower than required for second grade.
.....do.....	do.....	do.....	As in temporary permit issued by Territorial superintendent.

(1), observation ($\frac{1}{2}$), practice (1). Substitutions are allowed for any subject except the seven last named, twenty-seven months' teaching being considered the equivalent of the last two.

Group II.—Latin (2, 3, or 4), Spanish (2), German (2), Greek (2), trigonometry ($\frac{1}{2}$), sociology ($\frac{1}{2}$), ethics ($\frac{1}{2}$), geology ($\frac{1}{2}$), astronomy ($\frac{1}{2}$), commercial law ($\frac{1}{2}$), English history ($\frac{1}{2}$), chemistry (1), bookkeeping ($\frac{1}{2}$), physics (1), calculus ($\frac{1}{2}$). Substitutions are allowed for any credit in this group. Grades must accompany all applications for acceptance of credits.

² City certificates may be issued by city boards of education. "Each city is a law unto itself in the matter of certifying its teachers, but certificates issued by a city board are legal only in the city where issued." (9 cities in 1910.)

TABLE 1.—*The principal features of teachers'*

NEW YORK.

[Laws of New York, 1910, ch. 140, being ch. 16 of the Consolidated Laws, secs. 551-555. Handbook 7, September, 1910. Regulations relating to teachers' certificates.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
College graduate professional certificate.	Commissioner of education.	State.....	Any.....	Life.....	.....
College graduate professional provisional certificate.	do.....	do.....	do.....	3 years.....	Nonrenewable
College graduate certificate:					
Permanent.....	do.....	do.....	do.....	Life.....	.....
Limited.....	do.....	do.....	Any except primary or grammar grades in cities and in villages of 5,000 or more.	2 years.....	Extended 1 year; upon passing examination in psychology, history of education, principles of education, and methods.
Normal diplomas...	Commissioner of education, chairman and secretary of local board, and principal of normal school.	do.....	Any.....	Life.....	.....
State life certificate.	Commissioner of education.	do.....	do.....	do.....	.....
State limited certificate.	do.....	do.....	do.....	5 years.....	Nonrenewable, if remaining subjects are passed in one examination life certificate will be issued.
Special certificate..	School commissioner or city superintendent.	School commissioner, district or city (subject to ch. 140, sec. 551, Laws, 1910). ¹	Subjects named...	3 years.....	Renewable for 5-year periods after 2 years' experience.
Without examination (in elocution, sewing, cooking, manual training, vocal music).					
Upon examination (in kindergarten, drawing, commercial branches, stenography).	do.....	do.....	do.....	do.....	do.....

¹ These examination questions are of higher standard than those required for other certificates.

certificates in the various States—Continued.

NEW YORK.

[Laws of New York, 1910, ch. 140, being ch. 16 of the Consolidated Laws, secs. 551-555. Handbook 7, September, 1910. Regulations relating to teachers' certificates.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
3 years under provisional college graduate professional certificate	No examination required.....		Holder of a college graduate professional provisional certificate.
None.....	do.....		Graduation from an approved college course including education.
3 years.....	do.....		Do.
None.....	do.....		Graduation from an approved college.
None; 600 periods of practice teaching and observation.	do.....		Diploma from a New York State normal school or New York State normal college.
3 years.....	Commissioner of education.	Commissioner of education.	Examination in subjects required for elementary certificate and in algebra with a minimum grade of 75 per cent, and examination in following subjects: Group II, with an average of 75 per cent and minimum grade of 60 per cent, English and American literature, a foreign language (French, German, Latin [Caesar]), plane geometry, physics, chemistry, botany or zoology, physical geography, history (ancient, European, or Great Britain and Ireland), civics, drawing; Group III: History of education or psychology, methods and school management, school law. ¹
.....do.....	do.....	do.....	Examination in all of Groups I and III required for State life certificates and in physics, civics, drawing, and 10 additional credits in Group II.
None; applicant must satisfy commissioner he is qualified to teach the subject.			Graduation from approved high school or equivalent and from approved professional institution wherein the course of study in special subjects has been completed. Request from a city or district superintendent after position has been assured candidate.
.....do.....	Commissioner of education.	Commissioner of education.	Same as above, and in addition examination as follows: (1) For kindergarten certificate, training-school examination in history of education, psychology, principles of education, school management, primary methods, kindergarten methods; (2) for drawing certificate, in drawing; (3) for commercial certificate, in advanced bookkeeping, business arithmetic; (4) for stenographer's certificate, in stenography and typewriting.

¹ Indorsable in other districts or cities.

TABLE 1.—*The principal features of teachers'*

NEW YORK—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Training school certificate.	City superintendent.	City, indorsable by superintendents in other cities.	Any elementary school.	3 years.....	Renewable for 10-year periods on evidence of 2 years' successful experience.
Training class certificate.	School commissioner.	School commissioner's district; must be indorsed by any other commissioner, unless he can give valid reason for refusing.	Any school not maintaining an academic department. After 3 years' experience may teach in subacademic grades of school maintaining an academic department, provided holder entered training class on academic diploma.	do.....	Renewable for 10-year periods on evidence of 2 years' successful experience.
Rural school renewable certificate.	do.....	do.....	Any school not maintaining an academic department.	10 years.....	Renewable for 10 years, on evidence of 5 years' successful experience.
Academic certificate.	do.....	Particular school approved by school commissioner not maintaining an academic department.		2 years.....	Nonrenewable. May be extended 1 year for each 18 credits earned in examinations for life certificate while certificate is in force.
Elementary certificate.	do.....	do.....		do.....	May be extended 1 year for each 8 counts of academic work completed while in force.
Temporary license.	Commissioner of education.	School commissioners' district, school district, or city.	Any.....	Not to exceed 1 year.	Nonrenewable.
Local certificates ¹					

¹ Local certificates are issued according to authority conferred in special acts or in city charters or as may be authorized by the regents' general rules.

*certificates in the various States—Continued.***NEW YORK—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
Same as for normal diploma.	Commissioner of education.	Commissioner of education.	Graduation from a 4-year academic course required for admission to training school. Graduation from the 2-year professional course of training school and examination in arithmetic; geography; language, composition, and grammar; physiology and hygiene; nature study; American history, with civics; drawing; methods in reading, writing, and spelling; psychology; history of education; and school management.
None; in training class has had opportunity to observe work of critic teacher in grades at least twice each week and has been required to teach occasionally.	do.....	do.....	Examination in subjects required for a rural school renewable certificate, except algebra and one branch of history other than American; substitution of language, composition and grammar, including methods in same, for first-year English, and of methods in reading, writing, and spelling for methods in teaching. In addition, examination is required in psychology, and the questions in arithmetic and geography include questions in methods in those subjects.
2 years.....	do.....	do.....	Examination in penmanship; spelling; arithmetic; geography; first-year English; algebra; physiology and hygiene; nature study and agriculture; drawing; American history with civics; either ancient, European, or English and Irish history; history of education; school management; methods of teaching; and school law.
None.....	do.....	do.....	Holder of a regent's academic diploma. Issued only after engagement to teach has been made.
.....do.....	do.....	do.....	Examination in writing, spelling, arithmetic, geography, elementary United States history with civics, first-year English, physiology and hygiene, drawing. Minimum grade of 75 per cent. Issued only after engagement to teach has been made.
Do.....	No examination required.....		Issued at discretion of commissioner of education to meet emergencies.

TABLE 1.—*The principal features of teachers'***NORTH CAROLINA.**

[Public School Law of North Carolina, 1909, pp. 67-68.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
State certificate....	State board of examiners.	State.....	Any elementary school.	5 years.....	Reissued upon reexamination.
High-school certificate.	do.....	do.....	Any.....	3 years.....	do.....
Special high-school certificate (for assistant teachers). County certificates, first, second, and third grades.	do..... County superintendent.	do..... County.....	Branches named..... Any elementary school; third grade as assistant teacher only.	do..... 2, 1, and 1 year.	do..... First grade renewable at discretion of county superintendent; second and third grades can be reissued upon reexamination.

NORTH DAKOTA.

[Laws of 1911, chaps. 265, 266.]

Professional certificates: First grade— Upon examination.	State board of examiners.	State.....	Any.....	5 years or life.	.....
Without examination.	do.....	do.....	do.....	Life.....	.....
Do.....	do.....	do.....	do.....	2 years.....	Renewable for 5 years after 9 months' teaching on such certificate. Renewable for life after 5 years' teaching.

¹ The board of examiners may accredit the specific marks or standings given in high schools, summer schools, normal schools, and the other institutions of this State upon good evidence of proficiency in the subjects specified.

certificates in the various States—Continued.

NORTH CAROLINA.

[Public School Law of North Carolina, 1909, pp. 67-68.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
1 year.....	State board of examiners.	State board of examiners.	Certificate of county superintendent that applicant holds a first-grade certificate and has taught 1 year successfully. Examination in same subjects as required for county certificate. Minimum general average, 90 per cent.
None.....	do.....	do.....	(1) Graduation from college of high rank and examination in English, theory and practice of teaching, and school law. (2) Examination in above subjects and also in history (State, national, including civics, English, and general); advanced arithmetic; algebra; geometry; one of following languages—Latin (Cæsar, Cicero, Virgil), Greek (Anabasis), French, or German; and one of the following sciences—physical geography, physics, agriculture, chemistry, or botany.
do.....	do.....	do.....	Examination in subjects under (1) above and in such branches as applicant desires to teach.
do.....	County superintendent (State board prepares uniform examination questions which county superintendent may obtain upon application).	County superintendent.	Examination in spelling, reading, writing, arithmetic, drawing, language lessons and composition, grammar, geography, history of North Carolina, United States history, agriculture, physiology and hygiene, including nature and effects of alcoholic drinks and narcotics, and theory and practice of teaching. Minimum averages as follows: First grade, 90 per cent; second grade, 80 per cent; third grade, 70 per cent.

NORTH DAKOTA.

[Laws of 1911, chaps. 265, 266.]

18 months.....	State board of examiners.	State board of examiners.	Equivalent of a college education and all qualifications necessary for a second-grade professional certificate and examination in (1) foreign language, (2) a natural science other than the one presented for the second-grade professional certificate, (3) ethics, (4) political science, economics, or domestic science, (5) any 2 subjects of college grade listed for second-grade professional certificate and not previously offered by the applicant. ¹
9 months.....			Diploma from 4-year course of Teachers' College of the University of North Dakota.
None or 3 years (see last column).			Bachelor's diploma from a college of recognized standing which must show at least a 2-year course or 16 semester hours of professional training, or in lieu of such professional study holder must have had 3 years' successful teaching after receiving said diploma.

TABLE 1.—*The principal features of teachers'*
NORTH DAKOTA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Professional certificates—Contd. Second grade— Upon examination.	State board of examiners.	State	Any except in 4-year high schools.	5 years.....	Renewable at discretion of board for a period of years or for life.
Without examination.	do.....	do.....	do.....	5 years or life (see last column).	Renewable at discretion of board.
Do.....	do.....	do.....	do.....	2 years.....	Renewable for 5 years after 9 months' teaching on such certificate. Renewable for life after 5 years' teaching.
Teachers' College of the University of North Dakota diploma.	University trustees.	do.....	Any.....	do.....	Holder entitled to a first-grade professional certificate after 9 months' successful teaching.
Normal school diploma.	Normal school trustees.	do.....	Same as second-grade professional.	do.....	
Special certificates (drawing, music, kindergarten, primary subjects, agriculture, commercial subjects, domestic science, or manual and industrial training.	State board of examiners.	do.....	Subjects named...	At option of State board.	
Permit.....	do.....	do.....	Any.....	Maximum, 6 months, valid only until examination.	Nonrenewable.
Elementary certificates: First grade.....	do.....	do.....	Any grade up to and including the eighth grade, and in ninth grade in 1 year high schools.	3 years.....	Renewable by county superintendent under rules prescribed by State board.

¹The board of examiners may accredit the specific marks or standings given in high schools, summer schools, normal schools, and the other institutions of this State upon good evidence of proficiency in the subjects specified.

*certificates in the various States—Continued.***NORTH DAKOTA—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
9 months.....	State board of examiners.	State board of examiners.	Same as for first-grade elementary certificate and in addition examination in (1) psychology, (2) history of education, (3) principles of education, (4) school administration, (5) methods in elementary subjects, (6) rhetoric and composition, (7) American or English literature, (8) ancient, English, or American history, (9) 1 natural science (which may include agriculture), (10) higher algebra, solid geometry, manual training, or domestic science. ¹
.....do.....			Diploma from the advanced or 5-year course of State normal schools or the 2-year course for high-school graduates entitles holder to a life certificate. Diploma from the 4-year course of State normal schools or the 1-year course for high-school graduates entitles holder to a 5-year certificate.
None or 3 years (see last column).			Diploma or certificate from institution whose curriculum is equivalent to the 4-year or 5-year courses of the State normal schools, which must show at least a 2-year course or 16 semester hours of professional training; or in lieu of such professional study holder must have had 3 years' successful teaching after receiving said diploma.
None.....	No examination required.	No examination required.	Completion of the 4-year course ranks as first-grade professional certificate.
.....do.....	do.....	do.....	Diploma ranks same as second-grade professional certificate issued without examination.
None or 9 months (see last column).	State board of examiners (when required).	State board of examiners (when required).	Holder of at least a second-grade elementary certificate is entitled to special certificates in music, drawing, kindergarten, or primary subjects. Qualifications equivalent to the requirements for a second-grade professional certificate are essential for a special certificate in the other lines. Satisfactory evidence of proficiency in the special line may be obtained by examination or otherwise. ¹
None.....	No examination required.		Graduation from a college, but without experience or the professional training required.
8 months.....	State board of examiners.	State board of examiners.	Examination in same subjects as for a second-grade elementary certificate, and in addition elements of psychology and 4 of the following subjects of secondary grade: Elementary algebra, plane geometry, physics, physical geography, botany, elements of agriculture, nature study, manual training, domestic science, and American literature. ¹

TABLE 1.—*The principal features of teachers'*
NORTH DAKOTA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Elementary certificates—Contd. Second grade: Upon examination.	State board of examiners.	State	Rural schools and any grade up to and including the eighth.	2 years.....	Renewable by county superintendent under rules prescribed by State board.
Without examination.	do.....	do.....	do.....	do.....	do.....
High school diploma.	High school board of education.	do.....	do.....	do.....	Holder entitled to a first grade elementary certificate after 8 months' successful experience.
Permit.....	County superintendent.	County.....	Option of county superintendent.	Until next regular examination.	Nonrenewable.

OHIO.

[Ohio School Laws, 1906, pp. 167-179. Sess. Laws 1908, pp. 350-353, and 1910, pp. 305-306, 317-319.]

High-school life certificate: Plan I.....	State board of school examiners.	State.....	Any	Life.....	
Plan II.....	do.....	do.....	do.....	do.....	
Common-school life certificate: Plan I.....	do.....	do.....	Any, for branches named.	do.....	

¹The board of examiners may accredit the specific marks or standings given in high schools, summer schools, normal schools, and the other institutions of this State upon good evidence of proficiency in the subjects specified.

certificates in the various States—Continued.

NORTH DAKOTA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	State board of examiners.	State board of examiners.	Examination in reading, arithmetic, language and grammar, geography, United States history, physiology and hygiene (including physical culture), civil government, pedagogy, and one of the following: Music, drawing, agriculture, nature study, domestic science, manual training. ¹
.....do.....			Certificate of completion of 10½ months' course of State normal schools.
.....do.....	No examination required.		Diploma from high school doing 4 years' work, including psychology, pedagogy, and two senior review subjects.
.....do.....	do.....		Satisfactory evidence of qualifications and satisfactory reason for nonattendance at previous examination, and subject to the regulations of the board.

OHIO.

[Ohio School Laws, 1906, pp. 167-179. Sess. Laws 1908, pp. 350-353, and 1910, pp. 305-306, 317-319.]

50 months.....	State board of school examiners.	State board of school examiners.	Examination in subjects required for common-school life certificate and, in addition, in geometry, rhetoric, civil government, advanced algebra, advanced physics, Latin, psychology, history of education, science of education, and three of following: Chemistry, botany, zoology, astronomy, trigonometry and its applications, logic, Greek, German, and political economy. ²
(1) 24 months for holder of provisional certificate of same kind issued to college and normal-school graduates by State commissioner. (2) 10 years for holder of professional certificate of same grade issued by a city or county board of examiners.	do.....	do.....	(1) Holder of provisional high-school certificate issued by State commissioner and examination in theory and practice of teaching, history of education, and science of education. ² (2) Holder of professional high-school certificate issued by county board of examiners, and examinations in same subjects.
50 months.....	do.....	do.....	Examination in orthography, reading, writing, arithmetic, elementary algebra, geography, physical geography, English grammar and composition, United States history, including civil government, general history, English literature, physiology and hygiene, including effects of alcohol and narcotics, elementary physics, theory and practice of teaching, scientific temperance, and such other branches, if any, as they may elect. ²

² Examination for any kind of a certificate issued by the State board requires a minimum average of 85 per cent and a minimum grade of 80 per cent.

TABLE 1.—*The principal features of teachers'*

OHIO—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Common-school life certificate—Continued. Plan II.	State board of school examiners.	State.	Any, for branches named.	Life.	
Special life certificate: Plan I.	do.	do.	do.	do.	
Plan II.	do.	do.	do.	do.	
Provisional high-school certificate.	State commissioner.	do.	Any.	4 years.	Eligible after 24 months' experience for high-school life certificate.
Provisional elementary-school certificate.	do.	do.	Any, for branches named.	do.	Eligible after 24 months' experience for common-school life certificate.
Provisional special certificate.	do.	do.	do.	do.	Eligible after 24 months' experience for special life certificate.
Teachers' high-school certificate: Professional.	County or city board of school examiners.	State certificates issued by city board, valid in cities only.	High schools.	5 or 8 years. .	Renewable unless holder has not taught 4 years preceding.
Provisional ²	do.	County ²	do.	1, 2, or 3 years.	(³)

¹ Examination for any kind of a certificate issued by the state board requires a minimum average of 85 per cent and a minimum grade of 80 per cent.

² County and city boards of examiners may issue certificates without examination to holders of like certificates granted by other county and city boards of examiners.

certificates in the various States—Continued.

OHIO—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
Same as high-school life, Plan II.	State board of school examiners.	State board of school examiners.	(1) Holder of provisional elementary-school certificate issued by State commissioner and examination in theory and practice. ¹ (2) Holder of professional elementary certificate issued by county board, and examination in theory and practice.
50 months.....	do.....	do.....	Examination in special branches in which certificate is desired and in physiology and hygiene, including effects of alcohol and narcotics, psychology, theory and practice, history of education, and science of education as prescribed for high-school life certificates. ¹
Same as high-school life, Plan II.	do.....	do.....	(1) Holder of provisional special certificate issued by State commissioner and examination in theory and practice and in special branch. (2) Holder of professional special certificate issued by county board, and examination in same subject.
None.....	State department.	State department.	Graduation from any approved normal school, teachers' college, college, or university in a 4 years' academic and professional course requiring for entrance graduation from a high school of first grade and including actual secondary teaching under supervision in a training school. Examination in same subjects as for teacher's high-school certificate. ¹
.....do.....	do.....	do.....	Graduation from a 2-year academic and professional course in approved normal school, college, or university based on graduation from high school of first grade, including practice teaching under supervision and examination in same subjects as for teacher's elementary-school certificate.
.....do.....	do.....	do.....	Completion of special course in institutions named above, including practice teaching and examination in same subjects as for teacher's special certificate. ¹
40 months.....	State commissioner.	County board of examiners.	Examination in literature, general history, algebra, physics, physiology including narcotics, theory and practice of teaching, and four of following: Latin, German, rhetoric, civil government, geometry, physical geography, botany, and chemistry. Minimum average, 92 per cent; minimum grade, 85 per cent. These standings do not apply to city certificates.
None.....	do.....	do.....	Examination in same subjects; average and grade required not stipulated. ⁴

³ Discretion of board. If holder has taught 5 years continuously renewable by passing examination in theory and practice.

⁴ After September 1, 1912, all teachers in elementary schools in village, township, and special school districts must have passed an examination in elementary agriculture (Laws, 1911, H. B. 520).

TABLE 1.—*The principal features of teachers'*
OHIO—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Teachers' elementary school certificate: Professional.....	County or city board of school examiners.	State. (See professional high-school certificate.)	Elementary schools.	5 or 8 years..	Same as professional high-school certificate.
Provisional ²	do.....	County ²	do.....	1, 2, or 3 years.	(³)
Teachers' special certificate: Professional.....	do.....	State. (See professional high-school certificate.)	Branches named..	5 or 8 years..	Same as professional high school.
Provisional ²	do.....	County ²	do.....	1, 2, or 3 years.	Same as provisional elementary.
Temporary certificates.	do.....	County or city.	As designated.....	Until next examination.	Nonrenewable.

OKLAHOMA.

[Laws and Opinions for the Regulation and Support of the Common Schools, 1908, Articles III and XXV 1910, Article XV. Oklahoma Educational Directory and Requirements for State Certificates, pp. 101-105. Biennial Report of the Department of Public Instruction, 1908, pp. 134-146. Circular No. 6, from State department.]

Life diploma ⁶	State board of education.	State.....	Any.....	Life.....	.....
Superintendent's certificate.	do.....	do.....	Superintendent or teach any school.	Life, 10, or 5 years.	Nonrenewable.

¹ After September 1, 1912, all teachers in elementary schools in village, township, and special school districts must have passed an examination in elementary agriculture (Laws, 1911, H. B. 520).

² County and city boards of examiners may issue certificates without examination to holders of like certificates granted by other county and city boards of examiners.

³ Discretion of board. If holder has taught 5 years continuously renewable by passing examination in theory and practice.

⁴ County boards of examiners may issue provisional certificates without examination (except in theory and practice and science of education) to graduates of schools for training of teachers having a 2-year course who have also previously graduated from a first-grade high school.

certificates in the various States—Continued.

OHIO—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
40 months.....	State commissioner.	County board of examiners.	Examination in orthography, reading, writing, arithmetic, English grammar and composition, geography, history of United States, including civil government, physiology including narcotics, literature, theory and practice of teaching. ¹ Minimum average, 92 per cent; minimum grade, 85 per cent. These standings do not apply to city certificates. Examination in same subjects; standings not stipulated. ⁴
None.....	do.....	do.....	
40 months.....	do.....	do.....	Examination in subjects to be taught and in theory and practice of teaching with a minimum average of 92 per cent and grade of 85 per cent. These standings do no apply to city certificates.
None.....	do.....	do.....	Same examination; no standings stipulated.
.....do.....	County examiners when examination is required.	County board of examiners when examination is required.	Examination at discretion of county board of examiners.

OKLAHOMA.

[Laws and Opinions for the Regulation and Support of the Common Schools, 1908, Articles III and XXV; 1910, Article XV. Oklahoma Educational Directory and Requirements for State Certificates, pp. 101-105. Biennial Report of the Department of Public Instruction, 1908, pp. 134-146. Circular No. 6, from State department.]

10 years, 5 years, or 1 year.	State board of education.	State board of education.	Issued only to university or college graduates who are teachers of exceptionally successful experience, to superintendents, presidents of institutions of learning, and to others of eminent standing who present the qualifications for high-school or grammar certificates. Examination in arithmetic, elementary algebra, agriculture, bookkeeping, composition and rhetoric, civics, domestic science, drawing, geography, physical geography, English grammar, history of education, United States history, history of Oklahoma, general history, English literature, music, narcotics and stimulants, orthography, penmanship, physiology and hygiene, physics, psychology, reading, school law, school supervision, and theory and practice, with an average of 90 per cent and minimum of 70 per cent.
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⁵ Diplomas from educational institutions constitute certificates, as follows:

(a) From State normal school, life certificate good for any school; (b) from State University (at Norman), life certificate when countersigned by State superintendent; may be countersigned upon expiration of 16 months' teaching after graduation. Two years pedagogy and practice teaching accepted in lieu of experience; (c) from Colored Agricultural and Normal University, 5-year certificate; (d) from Oklahoma Agricultural and Mechanical College, permanent certificate of grade must be granted by State superintendent.

TABLE 1.—*The principal features of teachers'*

OKLAHOMA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
High-school certificate.	State board of education.	State	Any high school...	Life, 10, or 5 years. (See last column.)	Nonrenewable
Grammar-school certificate.	do.....	do.....	First to eighth grade, inclusive.	do.....	do.....
Primary certificate.	do.....	do.....	First to fourth grade, inclusive.	Life, 10 or 5 years.	do.....
Kindergarten certificate.	do.....	do.....	Kindergarten.	do.....	do.....
Special certificate (drawing, manual training, physical culture, ancient and modern languages, English history and civics, mathematics, science, music, commercial, technical, and industrial subjects).	do.....	do.....	Branches and grades named.	do.....	do.....

certificates in the various States—Continued.

OKLAHOMA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
1 year for 5-year certificate, or 1 year's work, 10 hours per week, in pedagogy, one-third of time in actual teaching in training school; for 10-year certificate, 5 years; for life certificate, 10 years.	State board of education.	State board of education.	Examination in subjects required for a grammar-school certificate, and in addition advanced algebra, plane geometry, history of education, advanced physics, psychology, and one branch each of Groups I, V, and VII, and two of Groups II, III, IV, and VI: <i>Group I.</i> —Astronomy, calculus, plane, solid, and spherical geometry, plane and spherical trigonometry, mechanics, and surveying. <i>Group II.</i> —Advanced agriculture, botany, chemistry, geology, mineralogy, zoology, biology, entomology, paleontology. <i>Group III.</i> —Ancient history, medieval history, English history, modern history, economic history, logic or ethics, political economy, sociology, European history. <i>Group IV.</i> —Oklahoma school law, philosophy of education, primary teaching, kindergarten training, school supervision, commercial law, practice teaching. <i>Group V.</i> —2 years' work in French, Greek, German, Latin, or Spanish. <i>Group VI.</i> —English novelists, English essays, English drama, history of English language, rhetoric (advanced), literary criticism. <i>Group VII.</i> —Mechanical drawing, domestic art, elocution, history of art, military science, physical culture, manual training. <i>Grading.</i> —For life certificate, average of 90 per cent, minimum of 80 per cent; for 10-year certificate average of 85 per cent, minimum 75 per cent; for 5-year certificate, average of 80 per cent, minimum 70 per cent.
Same, except alternative of pedagogy course is omitted. (See last column.)	do.....	do.....	Holder of first-grade county certificate or graduate of a reputable college and examination in subjects required for superintendent's certificate, except history of education, psychology, school law, and school supervision. <i>Grading.</i> —As in high-school certificate above.
Same as for grammar certificate.	do.....	do.....	Holder of first-grade county certificate or graduate of a reputable college who by examination shows familiarity with the methods of teaching the following: Music, numbers, nature study, drawing, reading language, penmanship, physiology, hygiene, narcotics and stimulants, agriculture, geography, history, domestic science; also how to originate busy work and industrial occupations. <i>Grading.</i> —As in high-school certificate above.
.....do.....	Not granted on examination.....		Graduation from the kindergarten training departments of Oklahoma State normal schools and other schools on accredited list.
Satisfactory standing as a teacher.	do.....		Applicant must satisfy board as to his scholarly attainments. "Candidates for a special high-school certificate must be a graduate of a reputable college and have had not less than 8 years of high-school and college work and must also have had not less than 3 years of special advanced training in subjects for which certificate is desired, including not less than half a year of post graduate work in some accredited university;" however, as an equivalent, board may consider any evidence of scholarship, education, experience, training, travel, or culture that may be offered.

TABLE 1.—*The principal features of teachers'*

OKLAHOMA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Elementary certificates (first, second, and third grade).	State board of education.	State	Elementary grades	Same as corresponding grade of county certificates.	
County certificates: First grade.....	County board of examiners.	State in- dorse- ment compul- sory.	Any.....	3 years.....	Renewed for original period if holder has attended 75 per cent of sessions of institutes and has taught 3 months each year and has average of 75 per cent.
Second grade.....	do.....	County and adjoining counties.	do.....	2 years.....	do.....
Third grade.....	do.....	County.....	do.....	1 year.....	Not more than two to same person.
Temporary certificate.	County superintendent.	District designated.	.....	Until next examination.	Not given a second time.

OREGON.

[Acts of 1911, Senate bill No. 101.]

Life State certificate	Superintendent of public instruction.	State.....	Any.....	Life.....	.....
State certificate.....	do.....	do.....	do.....	5 years.....	Renewable if holder has attended an institution of higher education for 32 consecutive weeks within 6 years of date of original issue upon satisfactory work in at least 4 subjects, one of which shall be education. May be again renewed in like manner.

certificates in the various States—Continued.

OKLAHOMA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
Same as first, second, and third grade county certificates.	State board of education.	State board of education.	Same as corresponding grades of county certificates.
12 months.....	do.....	Board of county examiners.	Examination in subjects required for second grade and, in addition, bookkeeping and the elements of natural philosophy, with an average of 90 per cent and minimum of 70 per cent.
3 months.....	do.....	do.....	Examination in subjects required for third grade and, in addition, civics, with an average of 80 per cent and a minimum of 60 per cent.
None.....	do.....	do.....	Examination in orthography, reading, writing, English grammar, composition, geography, arithmetic, United States history, physiology and hygiene, theory and practice of teaching, agriculture, domestic science, drawing, music, and history of Oklahoma, with an average of 70 per cent and a minimum of 50 per cent.
.....do.....	No examination required.....		Upon request of district; fitness determined by examination. Applicant must not have failed at any regular examination.

OREGON.

[Acts of 1911, Senate bill No. 101.]

60 months, 15 in State.	State board of examiners.	State board of examiners.	Examination in subjects required for 5-year State certificate and, in addition, botany, plane geometry, general history, physics, bookkeeping, geology, history of education, and English literature, with average of 85 per cent and minimum of 70 per cent.
12 months.....	do.....	do.....	Examination in subjects required for 1-year State certificate and, in addition, algebra, composition, physiology, psychology, and American literature, with average of 85 per cent and minimum of 70 per cent.

TABLE 1.—*The principal features of teachers'*
OREGON—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Special certificate. (See last column for subjects.)	Superintendent of public instruction.	School district.	Any; subject named.	Life.....	.....
College or university graduates' certificates:					
State life certificate.	do.....	State.....	High schools only and city superintendent.	do.....	.....
5-year State certificate.	do.....	do.....	do.....	5 years.....	.....
1-year State certificate.	do.....	do.....	do.....	1 year.....	.....
Normal-school graduates' certificates:					
State life certificate.	do.....	do.....	(1) Grammar schools and 1- year, 2-year, and 3-year high schools, and city superintendent; (2) any school. (See last column.)	Life.....	.....
5-year State certificate.	do.....	do.....	Same as (1) above.	5 years.....	.....
1-year State certificate.	do.....	do.....	do.....	1 year.....	.....
1-year State certificate: Upon examination.	do.....	do.....	Any.....	do.....	Renewable only once on evidence of 6 months successful teaching during life of certificate. do.
Without examination.	do.....	do.....	do.....	do.....	do.
Primary State certificate.	do.....	do.....	Not above third grade.	5 years.....	(1) Same as 5-year State certificate; or (2) not less than 32 months successful teaching during life of certificate; (3) renewable again under same conditions.

¹ Districts having a population of more than 100,000.

certificates in the various States—Continued.

OREGON—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	No examination required.	No examination required.	Upon request of local board of directors superintendent of public instruction may issue, at his discretion without examination, to teachers of library science, music, agriculture, art, manual training, penmanship, kindergarten, domestic science and domestic art, typewriting, stenography, bookkeeping, and physical culture. Applicant must present to superintendent of public instruction credentials showing special fitness for subject he wishes to teach.
30 months.....	do .....	.....	Holder of a 5-year State high-school certificate and recommendation of county superintendent where applicant last taught.
6 months.....	do .....	.....	Holder of a 1-year State high-school certificate and recommendation of county superintendent where applicant last taught.
None.....	do .....	.....	Graduate from standard college or university, having completed 120 semester hours, including 15 semester hours in education. ¹
30 months.....	do .....	.....	Holder of a 5-year normal school graduate's State certificate, and recommendation of the county superintendent where applicant last taught. Completion of 2 years of work in a standard college or university or graduation from the standard college course of the Oregon Normal School, if said school shall meet the requirements of standard colleges, render certificate valid in any of the schools in the State. ¹
6 months.....	do .....	.....	Holder of a 1-year normal school graduate's State certificate and recommendation of the county superintendent where applicant last taught.
None.....	do .....	.....	Graduate from a standard normal school. ¹
do	State board of examiners.	State board of examiners.	Examination in arithmetic, civil government, geography, grammar, history, orthography, physical geography, reading, school law, theory and practice of teaching, and writing, with average of 75 per cent and no grade less than 60 per cent.
do .....	.....	.....	Completion of 4 years work in an accredited high school or other accredited institution, including completion of the teachers' training course in said institution.
12 months in the State.	State board of examiners.	State board of examiners.	Examination in methods in reading, methods in arithmetic, methods in language, methods in geography, theory and practice of teaching, writing, physiology, orthography, and psychology; and in addition thereto a thesis on a subject to be selected from list prepared by superintendent of public instruction.

TABLE 1.—*The principal features of teachers'*

OREGON—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Temporary permit.	County superintendent.	State.....	Any.....	Until next examination.	Only 1 to each person within a period of 3 years.
Special district certificates. ¹	District board of examiners.	District....	do.....	Optional of district board.	.....

PENNSYLVANIA.

[Act 1911, No. 191.]

Permanent State certificate.	Superintendent of public instruction.	State.....	Branches named..	Life.....	.....
College certificates: Permanent.....	do.....	do.....	do.....	do.....	.....
Provisional.....	do.....	do.....	do.....	3 annual school terms.	.....
State normal school diploma.	State normal school.	do.....	do.....	Life.....	.....
State normal school certificate.	do.....	do.....	do.....	2 annual school terms.	.....
Special certificates (kindergarten, drawing, vocal music, manual training, physical training, etc.).	do.....	do.....	do.....	Life or term of years.	.....
Professional certificate.	County or district superintendent.	County or district (indorsable by other county or district superintendents in districts of second or third class).	do.....	3 years.....	Renewable on examination in 2 of the elective branches for a professional certificate not before offered by the applicant. Not renewable more than 3 times. ³
Provisional certificate.	do.....	County or district (nonindorsable).	do.....	1 year.....	May not teach more than 5 school terms on a provisional certificate.

¹ See Appendix, p. 257.² A county or district superintendent may, after satisfactory examination, add additional branches to any provisional certificate which he issues or may grant to holders of State or professional certificates, after examination, provisional certificates in any branches additional to those on their certificates, subject to all provisions relating to provisional certificates.

*certificates in the various States—Continued.***OREGON—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	County superintendent, when necessary. (See last column.)	County superintendent, when necessary. (See last column.)	(1) Holder of a certificate of another State or (2) an examination equivalent to that required for a 1-year State certificate.
.....	District board of examiners.	District board of examiners.	

PENNSYLVANIA.

[Act 1911, No. 191.]

2 school terms....	Examining board.	Examining board.	Holder of a professional certificate, for 2 or more years, and certificates of successful teaching during 2 school terms from proper superintendents and boards of school directors; proof of careful reading of at least 4 books on pedagogy approved by the State superintendent; and examination in all the branches enumerated under requirements for professional and provisional certificates. ²
3 years in State....	No examination required.....		Graduation from a college or university approved by the College and University Council of Pennsylvania, and of approved departments therein.
None.....	do.....		Same as for permanent college certificate on evidence of having completed during his college or university course not less than 200 hours' work in pedagogical studies such as psychology, ethics, logic, history of education, school management, and methods of teaching.
2 school terms....	do.....	do.....	Diploma issued by a State normal school of Pennsylvania.
None.....	State board of normal school examiners.	State board of normal school examiners.	Certificate from a State normal school of Pennsylvania.
.....do.....	(See last column)..	(See last column)..	Graduate of an approved special school of such subjects, under such conditions as State superintendent may impose.
2 full school terms..	County or district superintendent.	County or district superintendent.	Examination in all branches required for a provisional certificate and in addition any two of the following: Vocal music, drawing, English literature, plane geometry, general history, physical geography, elementary botany, elementary zoology, or elementary physics. Must satisfy said superintendent of intelligent reading of two of the books on pedagogy approved for such purposes by the State superintendent. ²
None.....	do.....	do.....	Examination in spelling, reading, writing, physiology and hygiene, geography, grammar, arithmetic, elementary algebra, history of the United States and of Pennsylvania, civil government, including State and local government, school management, and methods of teaching. ²

² Teachers who have held professional certificates for 10 years or more may continue to teach the subjects embraced in their certificates in the districts in which they are now teaching without further examination.

TABLE 1.—*The principal features of teachers'*

RHODE ISLAND.

[Laws of Rhode Island, relating to education, 1910, chap. 68, p. 25. Rhode Island Education Circulars, Examination and Certification of Teachers, June 30 and July 1, 1910; The Certification of Superintendents of Schools, 1903.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Superintendents' certificates:					
First-class permanent.	State board of education.	State.....	Any.....	Unlimited..	.....
First-class temporary.	do.....	do.....	do.....	5 years or until holder is entitled to permanent of first class.	.....
Second-class permanent.	do.....	do.....	do.....	Unlimited.	.....
Second-class temporary.	do.....	do.....	do.....	5 years or until holder is entitled to permanent of second class.	.....
Third-class temporary (only).	do.....	Town.....	do.....	1 year.....	Nonrenewable.
First-grade certificate:					
Upon examination.	do.....	State.....	do.....	3 years.....	Renewable 6 years first and second time; third time may be permanent.
Without examination.	do.....	do.....	do.....	do.....	do.....
Second-grade certificate:					
Upon examination.	do.....	do.....	do.....	2 years.....	Renewable 4 years first time; 9 years second time; third time may be permanent.
Without examination.	do.....	do.....	do.....	do.....	do.....

¹ Special training for superintendence consisting of 1 year's course in supervision and administration at an approved normal school, college, or university, or successful experience of 10 years in teaching may be accredited as the equivalent of 5 years' experience in superintendence; but in no case shall a permanent certificate be granted to any person who has not had at least 5 years' experience in superintendence.

*certificates in the various States—Continued.***RHODE ISLAND.**

[Laws of Rhode Island, relating to education, 1910, chap. 68, p. 25. Rhode Island Education Circulars Examination and Certification of Teachers, June 30 and July 1, 1910; The Certification of Superintendents of Schools, 1908.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
10 years' successful experience as superintendent. ¹	No examination required		Graduation from approved college or normal school, or equivalent education. ²
5 years' successful experience as superintendent.	do.....		Do.
Same as first-class permanent.	do.....		Secondary education or equivalent. ²
Same as first-class temporary.	do.....		Do.
	do.....		Qualifications not equal to above but satisfactory evidence of scholastic and professional qualifications for service and approval by school committee employing the applicant.
None under regular rules. Sometimes required in special cases not under an ordinary rule.	State board of education.	State board of education.	Must have held a second-grade certificate and have passed examination for the same, and in addition examination in the following subjects: Solid and spherical geometry, trigonometry, geology and mineralogy, chemistry, history of mediæval and modern Europe, Latin or French, advanced algebra or analytical geometry, physics, political and constitutional history of the United States or English history, botany or zoology, Greek or German, history of education, educational psychology, philosophy of education, methodology, school management, and school law. Certification of completion of requirements in any subject in an approved institution may be accepted.
.....do.....			Graduation from approved university or college, and satisfactory course in professional subjects or 5 years' successful experience.
.....do.....	State board of education.	State board of education.	Must have held a third-grade certificate or have passed examination for the same, and in addition examination in the following subjects: Algebra, plane geometry, elements of physics, elements of chemistry, botany or zoology, rhetoric, English literature, civics, political and constitutional history of United States or Greek history to death of Alexander, commercial geography or Roman history to the death of Marcus Aurelius, and in professional subjects required for first-grade certificate. College work accepted as above.
.....do.....			Graduation from an approved normal school from course of 2½ years following high-school course of 4 years.

² In lieu of other evidence, examination may be held to determine scholastic and professional qualifications.

TABLE 1.—*The principal features of teachers'*
RHODE ISLAND—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Third-grade certificate: Upon examination.	State board of education.	State	Any	2 years.....	Renewable 4 years first time; 6 years second time.
Without examination.	do.....	do.....	do.....	do.....	do.....
Fourth-grade certificate.	do.....	do.....	do.....	do.....	Renewable only as a fourth-grade evening school for 4 years.
Temporary certificate.	do.....	do.....	do.....	1 year or until next examination.	Nonrenewable.
Evening-school certificate: First grade.....	do.....	do.....	Evening schools...	3 years.....	{ Same as for same grade of regular certificate, except no permanent certificates.
Third grade.....	do.....	do.....	do.....	2 years.....	
Fourth grade.....	do.....	do.....	do.....	do.....	
Special certificates ("any special branch," including kindergarten).	do.....	do.....	Subjects named...	2 years.....	Same as for second grade.
Conditional certificates.	do.....	do.....	Any	Same as temporary.	Nonrenewable.

SOUTH CAROLINA.

[General School Law of South Carolina (containing regulations of State board of education), 1909, pp. 19-23, 57-63.]

State certificate....	Governor and State superintendent, confirmed by State board of education.	State.....	Any	2 years.....	Renewable....
Licentiate of instruction diploma.	Governing board of institution.	do.....	do.....	do.....	do.....
County certificate (first, second, and third grade).	County board of education.	County; registration in any other county permitted.	do.....	do.....	First and second grade renewable at option of board if institutes attended; third grade can not be renewed.
County certificates without examination.	do.....	do.....	do.....	do.....	Optional.....

certificates in the various States—Continued.

RHODE ISLAND—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None under regular rules. Sometimes required in special cases not under an ordinary rule. do.	State board of education.	State board of education.	Issued mainly upon examination in arithmetic, language, geography, history, physiology, reading, spelling, penmanship, methods, school management, and school law.
do.	State board of education.	State board of education.	Graduation from normal schools not quite up to the standard for second grade. Also upon long and successful experience, with work in summer schools and the like.
Successful experience.	do.	do.	Simple examination in the same subjects as for the third grade, except professional subjects.
None.	do.	do.	College graduation without qualification in professional subjects or successful experience.
do.	do.	do.	Graduates of approved colleges and universities.
do.	do.	do.	Same conditions as for third grade, except professional subjects not required.
None.	No examination required.		Issued only as a renewal of a fourth-grade certificate.
do.	State board of education.	State board of education.	Upon presentation of satisfactory evidence of preparation in specialty. Kindergarten certificates may be made valid for first and second grades of primary schools. Granted to candidates who fail to pass in one or two subjects, but whose general average is good.

SOUTH CAROLINA.

[General School Law of South Carolina (containing regulations of State board of education), 1909, pp. 19-23, 57-63.]

None.	No examination required.		Diploma of graduation from reputable university or college in some other State of as high rank as the leading colleges within the State or completion of 9 courses at State summer school.
do.	do.		Course of study of institution must have received approval of State board of education.
do.	State board of education.	County board of education.	Examination in following subjects: Algebra, arithmetic, United States history, civics and current events, grammar, physiology, geography, pedagogy, and agriculture. Minimum averages and grades, respectively, as follows: First grade, 80 per cent and 50 per cent; second grade, 70 per cent and 45 per cent; third grade, 60 per cent and 40 per cent.
do.	No examination required.		Completion of 9 courses at county or district summer schools. Diploma of graduation from accredited higher institution within the State.

TABLE 1.—*The principal features of teachers'***SOUTH DAKOTA.**

[School Laws of South Dakota, 1909, pp. 4-6, 15-17, 64-66, 81.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Life diploma: Upon examina- tion.	State superintend- ent.	State.....	Any.....	Life.....	
Upon diploma.....	do.....	do.....	do.....	do.....	
State certificate: Upon examina- tion.	do.....	do.....	do.....	5 years.....	Renewable; successful experience and full at- tendance county in- stitute dur- ing current year.
Upon diploma.....	do.....	do.....	do.....	do.....	do.....
Provisional State certificate.	do.....	do.....	do.....	2 years ¹	
Regents' certificate.	Regents of educa- tion.	do.....	Elementary grades	2 years.....	Not deter- mined.
First-grade certi- ficate.	State superintend- ent.	do.....	do.....	3 years.....	Same as State certificate.
Second-grade cer- tificate.	do.....	County (may be indorsed in other counties).	do.....	2 years.....	Nonrenewable
Third-grade certi- ficate.	do.....	District specified.	do.....	1 year.....	do.....
Primary certificate.	do.....	County, in cities and towns only (may be indorsed in other counties).	Kindergarten, first and second grades.	5 years.....	Same as State certificate.

¹ Issued for necessary probationary period for a State certificate.

certificates in the various States—Continued.

SOUTH DAKOTA.

[School Laws of S. Dak., 1909, pp. 4-6, 15-17, 64-66, 81.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
40 months.....	State superintendent.	State superintendent.	Proficiency in reading, orthography, penmanship, arithmetic, geography, grammar, composition, United States history, South Dakota history, civics, physiology and hygiene, and examination in physical geography, physics, algebra, geometry, general history, English language and rhetoric, English and American literature, either economics or sociology, and any two of botany, zoology, physiology, physics, chemistry, Latin, German, geology and mineralogy, astronomy, algebra, and trigonometry, all of the college grade; and pedagogy, including principles, methods, management, psychology, and history of education.
.....do.....	No examination required.....		Graduation from an approved college or university having a regular 4-year course above a 4-year high-school course, with a course of pedagogical studies and professional training comprising at least one-fourth work during at least 18 months; or graduation from an approved normal school, having at least a 2-year course above a 4-year high-school course.
24 months.....	State superintendent.	State superintendent.	Proficiency in orthography, reading, penmanship, arithmetic, geography, English grammar, physiology and hygiene, United States history, including South Dakota history, and examination in civil government, American literature, drawing, algebra, plane geometry, physical geography, physics or botany, general history, pedagogy, and English language, composition, and rhetoric.
18 months.....	No examination required.....		Graduation from approved normal school giving 1 year's work above 4-year high-school course; applicant must have had at least one-fourth work during at least 18 months in pedagogy and professional training.
None.....	do.....		Do.
.....do.....	do.....		Twenty-two week's attendance at a State normal school and an examination in subjects prescribed by regents.
.....do.....	State superintendent.	State superintendent.	Examination in orthography, reading, writing, arithmetic, geography, physical geography, English grammar, physiology and hygiene, history of United States, civil government, current events, American literature, South Dakota history, drawing, and didactics.
.....do.....	do.....	do.....	Examination in orthography, reading, writing, arithmetic, physiology and hygiene, geography, English grammar, history of United States, civil government, South Dakota history, didactics, and drawing.
.....do.....	do.....	do.....	Issued in discretion of State superintendent to those unable to pass second-grade examination.
.....do.....	do.....	do.....	Examination in reading, writing, orthography, arithmetic, physiology and hygiene, with special reference to effects of alcoholic drinks, etc., geography, English grammar, United States history, South Dakota history, drawing, didactics, and kindergarten and primary methods.

TABLE 1.—*The principal features of teachers'*
SOUTH DAKOTA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Special temporary certificate (first, second, or third grade).	County superintendent.	District specified.	Elementary schools.	Until next regular examination.	Nonrenewable
Local certificate (cities of first class). ¹	Examining committee (superintendent and 2 others).	City as determined by local board and examining committee..			
Special certificate in special subjects. ²	do.....	do.....			

TENNESSEE.

[Public School Laws of Tennessee, 1909, pp. 6, 21, 78, 82. Memorandum from office of State superintendent. Circular regulations governing the examination and certification of high-school teachers in Tennessee, 1911.]

County high-school State certificate: ³ Without examination.	State superintendent.	State.....	High schools.....	1 year.....	Renewable annually for continuous service.
Upon examination (1).	do.....	do.....	do.....	5 years.....	Renewable indefinitely for continuous service.
Upon examination (2).	do.....	do.....	High schools in subjects named.	3 years.....	Renewable; 2 years for continuous service.
Upon examination (3).	do.....	County.....	do.....	2 years.....	Reissued upon examination.
State normal school graduates' permanent license.	State board of education.	State.....	Any.....	Life.....	
State normal school certificate of graduation.	do.....	do.....	do.....	4 years.....	See permanent license.
Secondary certificate: ³ Upon examination (first and second grades).	County superintendent.	County.....	do.....	1 year.....	Renewable; successful teaching; keeping up reading-circle course.

¹ The superintendent in all other independent districts must indorse certificate of county superintendent in order to make it valid in such district. He may require such additional examination as he desires.

² All certificates in special subjects, music, drawing, penmanship, bookkeeping, foreign languages, kindergarten, etc., are issued by local examiners.

certificates in the various States—Continued.

SOUTH DAKOTA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	County superintendent.	County superintendent.	Examination in branches required for such certificates on regular examination.
.....	Examining committee.	Examining committee.	As determined by local board and examining committee.
.....	do.....	do.....	Same as above, for local certificate.

TENNESSEE.

[Public School Laws of Tennessee, 1909, pp. 6, 21, 78, 82. Memorandum from office of State superintendent. Circular regulations governing the examination and certification of high-school teachers in Tennessee, 1911.]

None .....	.....	.....	Holder of a bachelor's diploma from the University of Tennessee or an equivalent institution, who has taken at least 2 courses of not less than 3 months each of professional work, or who has passed satisfactory State examination on such subjects.
.....do.....	State board of education.	State board of education.	Examination in following 5 groups, spelling and grammar being included in each group: (1) English—rhetoric and literature; (2) Latin—Latin grammar, Caesar, Cicero, Vergil (Greek, German, French, or Spanish may be taken with the Latin); (3) History—American, English, general, and civil government; (4) Biology, physiology, physics, physical geography, chemistry, agriculture, and geology of Tennessee; (5) Mathematics—arithmetic, algebra, geometry. Minimum average, 80; minimum grade, 70.
.....do.....	do.....	do.....	Examination in one or more of above groups with same minimum requirements. Also in (6) domestic science and (7) commercial branches—commercial arithmetic, commercial law, stenography, and typewriting.
.....do.....	do.....	County examining committee.	Examination in one or more of above subjects with same minimum requirements.
15 months after graduation.	.....	.....	Graduation from a State normal school and examination in additional courses of reading and study.
None .....	.....	.....	Graduation from one of the State normal schools.
.....do.....	County superintendent.	County superintendent.	Examination in subjects required for primary certificate and, in addition, in elements of algebra, plane geometry, bookkeeping, rhetoric, civil government, physics, geology of Tennessee, and agriculture. If general average is 85 per cent or above, certificate is called first grade; if general average is from 85 per cent to 70 per cent, certificate is called second grade.

³ The term "secondary school" as used in Tennessee signifies a school consisting "of a principal and when necessary an assistant or assistants," in which in addition to the common branches the following subjects "shall be taught": Geology of Tennessee, natural philosophy, bookkeeping, civil government, rhetoric or higher English, and elocution. The term "high school" signifies the usual secondary school of other States.

TABLE 1.—*The principal features of teachers'*

TENNESSEE—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Secondary certificate—Contd. Without examination (1).	County superintendent (see last column).	County (see last column).	Any	1 year	Renewed every year during life of holder.
Without examination (2).	do.....	do.....	do.....	do.....	Renewed every year for 4 years, or for 9 years if "State secondary certificate" is renewed (see last column).
Primary certificate: Without examination.	do.....	do.....	Only in schools teaching common branches named in last column (upon examination).	do.....	Renewable if "State primary" is renewed (see last column).
Upon examination (third grade).	County superintendent.	County.....	do.....	do.....	Same as secondary certificate upon examination.

TEXAS.

[General Laws, 1911, chap. 96; School Laws, 1909, secs. 83-107, pp. 31-44.]

Permanent State certificate. Without examination.	State superintendent.	State.....	Any.....	Life, or during good behavior.	.....
Upon examination.	do.....	do.....	do.....	do.....	.....

¹ Prior to 1909 a valid certificate could be issued only by a county superintendent. The State superintendent had authority only "to prescribe the mode of examining and licensing teachers, and their necessary qualifications." See note 3, p. 105.

certificates in the various States—Continued.

TENNESSEE—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	No examination required.....		Holder of degree of licentiate of instruction from Peabody Normal College is entitled to a secondary certificate in any county in the State. ¹
.....do.....	do.....		Holder of "State secondary certificate." This certificate is issued upon examination. The questions are prepared in the State office and the papers are graded by the State institute instructors. The holder is entitled to a secondary certificate in any county in the State. Its duration is 5 years, renewable for 5 years upon 15 days' institute attendance. ¹
.....do.....	do.....		Holder of a State primary certificate, which is obtained in same manner as and has corresponding validity to the "State secondary certificate." Its duration is 1 year, renewable upon 15 days' attendance upon State institute. ¹
.....do.....	County superintendent.	County superintendent.	Examination in spelling, reading, arithmetic, grammar, geography, State history, and American history. Minimum average, 85 per cent, called third-grade certificate.

TEXAS.

[General Laws, 1911, chap. 96; School Laws, 1909, secs. 83-107, pp. 31-44.]

None, or 3 years in State.	No examination required.....		(1) Holder of bachelor's degree from institution of "first class" "who has completed 4 full courses in education and pedagogy." Those who can not meet the last condition may present in lieu thereof 3 years' successful experience in Texas. (2) Holder of University of Texas teachers' diploma showing completion of 4 full courses in department of education, and satisfying the requirements for degree of bachelor of arts. (3) Holder of a diploma from the Peabody Normal College at Nashville, Tenn. (4) Holder of a valid first-grade certificate issued to those completing the necessary requirements at the College of Industrial Arts (see first-grade certificate); and 3 years' successful experience in Texas.
None.....	State department of education.	State board of examiners. ²	(1) Examination in the subjects required for a first-grade certificate, and, in addition, history of education, English and American literature, chemistry, solid geometry, physics, plane trigonometry, and elementary double-entry bookkeeping. Minimum average, 85 per cent; minimum grade, 50 per cent. (2) Holder of a State permanent primary certificate who, during the first 6 years of its validity shall pass the required examination in the following additional subjects: Algebra, physics, elementary geometry, general history, chemistry, solid geometry, plane trigonometry, and elementary double-entry bookkeeping. ³ (3) Holder of a valid first-grade certificate and examination in the required additional subjects under (2) above.

² Summer normal institutes in Texas are authorized to hold examinations for certification of teachers. Certificates thus obtained shall be of the same class and governed by the same laws as to terms of validity as are other State certificates.

³ If the State permanent primary certificate was secured by building on a State first-grade certificate, reexamination in algebra, physics, elementary geometry, and general history is not required.

TABLE 1.—*The principal features of teachers'***TEXAS**—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Texas State Normal College diploma.	State superintendent.	State	Any	Life, or during good behavior.	
State permanent primary certificate.	do.....	do.....	All grades below the high school.	do.....	May build to permanent State certificate during first 6 years.
State kindergarten certificates:					
Permanent.....	do.....	do.....	Kindergarten.....	do.....	
Temporary.....	do.....	do.....	do.....	4 years.....	
Texas State Normal College certificates:					
First-grade.....	State board of education.	do.....	Any.....	6 years.....	
Second-grade.....	do.....	do.....	Any grade below high school.	4 years.....	
First-grade State certificate: Upon examination.	State superintendent.	do.....	Any.....	4 or 6 years. (See last column.)	May build to permanent State or permanent primary State certificate.
Without examination.	do.....	do.....	do.....	6 years.....	
Do.....	do.....	do.....	do.....	4 years.....	

certificates in the various States—Continued.

TEXAS—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	No examination required.	.....	A diploma from a Texas State normal college shall rank as a permanent State certificate.
.....do.....	State department of education.	State board of examiners.	(1) Examination in subjects required for a second-grade certificate, and, in addition, civil government, English composition, physical geography, history of education, elementary psychology applied to teaching, and English and American literature. (2) Holder of a valid first-grade certificate, and examination in the following additional subjects: History of education—elementary psychology applied to teaching, and English and American literature. Minimum average, 85 per cent. minimum grade, 50 per cent. (3) Holder of a valid second-grade certificate and examination in the required additional subjects, making the required grades.
3 years successful experience in kindergartens of State.	No examination required.....		Holder of a valid temporary State kindergarten certificate, after 3 years' experience.
None.....	do.....		(1) Graduation from regular course of a State educational institution in Texas maintaining a department for training kindergarten teachers, and completion of the kindergarten course consisting of not less than 2 years' training with daily practice in the kindergarten. (2) Graduation from kindergarten training schools and departments approved by the State superintendent of public instruction.
.....do.....	do.....		Completion of 2 years' work in a Texas State Normal College.
.....do.....	do.....		Completion of 1 year's work in a Texas State Normal College.
.....do.....	State department of education.	State board of examiners.	(1) Examination in all subjects required for a second-grade certificate, and, in addition, in English composition, civil government, algebra, physical geography, elements of geometry, and general history. Minimum average of 85 per cent, and grade of 50 per cent, render certificate valid for 6 years; minimum average of 75 per cent, and grade of 50 per cent render certificate valid for 4 years. (2) Holder of a valid second-grade certificate and examination in the prescribed additional subjects.
.....do.....	No examination required.	.....	Completion of regular course for graduation in the College of Industrial Arts, and in addition two full courses in education.
.....do.....	do.....	.....	Completion of four full courses in the College of Arts, and one full course in the department of education in the University of Texas or in any university or college ranked as "first class" by the State superintendent, upon recommendation of State board of examiners.

TABLE 1.—*The principal features of teachers'*

TEXAS—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Second-grade State certificate.	State superintendent.	State.....	Grades below high school.	6 years or 4 years. (See last column.)	May build to first-grade or permanent primary certificate.
Second-grade county certificate.	County board of examiners.	County.....	do.....	do.....	Only one to same individual.
City certificates: ¹ Permanent (high school, first-grade, primary).	City board of examiners.	City.....	As board of trustees desires.	During good behavior.	Varies.....
Temporary (high school, first-grade, second-grade).	do.....	do.....	do.....	Not more than 4 years.	As determined by board of trustees based upon reading, attendance upon city institutes, or other means of professional growth.

UTAH.

[Laws of Utah, 1905, chap. 71; 1907, chap. 42; 1909, chap. 45; circular letter of State superintendent (no date).]

State professional high-school diploma.	State board of education.	State.....	Any.....	Life; lapses upon expiration of 5 years' nonteaching period.	.....
State professional grammar diploma.	do.....	do.....	Elementary.....	do.....	.....
State grammar certificate.	do.....	do.....	do.....	5 years.....	Renewable upon presentation of 6 hours of additional work from a reputable institution, 3 hours of which must be of college grade.

"A city or town which has a scholastic population of 500 or more and has become an independent district, and which levies a local tax for educational purposes, or maintains a system of free schools for 9 months in each year, and which has employed a superintendent of city schools, may have a city board of examiners," and issue certificates.

*certificates in the various States—Continued.***TEXAS—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	State department of education.	State board of examiners.	Examination in spelling, reading, writing, arithmetic, English grammar, geography, Texas history, elementary physiology and hygiene, with special reference to narcotics, school management, and methods of teaching, United States history, and elementary agriculture. Minimum average of 85 per cent, and grade of 50 per cent, render certificate valid for 6 years; minimum average of 75 per cent, and grade 50 per cent render certificate valid for 4 years.
do.....	do.....	County board of examiners.	Same as for second-grade State certificate.
3 years in Texas...	City board of examiners.	City board of examiners.	Requirements can not be lower than those prescribed by law for permanent State or county certificates of corresponding grade.
None.....	do.....	do.....	Same, except omit "permanent."

UTAH.

[Laws of Utah, 1905, chap. 71; 1907, chap. 42; 1909, chap. 45; circular letter of State superintendent (no date).]

2 years' experience in State.	State board of education.	State board of education.	Graduation from a college course, including professional subjects and credits ² in arithmetic, United States history, reading and elocution, orthography, English grammar, political and physical geography, physiology, algebra, physics, rhetoric, drawing, plane and solid geometry, botany, English literature, general history, civil government, history and science of education, and psychology; and also in three of following—chemistry, geology, French, German, Latin, Greek, trigonometry, geology, biology, and mineralogy. Holders of normal diplomas from University of Utah are entitled to this diploma after 2 years' successful experience.
do.....	do.....	do.....	Completion of 4 years of high-school and 1 year of college work and credits ² showing satisfactory knowledge of required subjects named above, except solid geometry and the three electives.
do.....	do.....	do.....	Credits ² covering 4 years of high-school work, including 3 years of English, algebra, physics, civil government, botany, and physical geography; also credits in psychology and history of education.

² Credits may be based upon properly authenticated work done in an educational institution, upon grades received in examinations previously taken, or upon an examination conducted by the State board of education.

TABLE 1.—*The principal features of teachers'*

UTAH—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
University diploma	University.....	State.....	High and elementary schools.	Life.....	
Normal grammar diploma.	School of education of University of Utah.	..do.....	Elementary.....	..do.....	See State professional high-school diploma, last column.
Normal certificates.	..do.....	..do.....	Grades or subjects specified.	5 years.....	
Temporary State high-school certificate.	State board of education.	..do.....	High schools.....	1 year.....	Renewed at discretion of State board for 1 year.
Normal certificate.	..do.....	..do.....	Elementary.....	2 years.....	Nonrenewable.
County grammar certificate.	..do.....	..do.....	Elementary, except in cities.	..do.....	May be renewed year by year under such regulations as the board may prescribe. ¹
County primary certificate.	..do.....	..do.....	Primary, except in cities.	..do.....	..do.....
Temporary county certificate.	..do.....	..do.....	In school specified.	Until next examination.	Nonrenewable.
City certificates: ²	Board of education	City.....	High-school teachers and principals of grade schools.	Varies.....	Varies.....
1. High school....					
2. Grammar.....					
3. Primary.....					
			Fifth to eighth grades.	..do.....	..do.....
			First to fourth grades.	..do.....	..do.....

VERMONT.

[General laws of the State of Vermont relating to public instruction, in force August 1, 1907 (chaps. 44 and 46), pp. 267-271, 275; Acts of 1908, chap. 37; Acts of 1910, Nos. 61 and 64.]

Unlimited certificate.	State superintendent of education.	State.....	Any.....	Until revoked.	.....
Normal school certificate of graduation:					
Higher course....	State board of education.	..do.....	..do.....	10 years.....	Original period twice.
Lower course.....	..do.....	..do.....	..do.....	5 years.....	10 years, then permanent.

¹ In 1910 without examination to teachers whose examination record for 1909 was above average of 75 and grade of 60 per cent, provided school work was indorsed by county superintendent and if 6 units of summer-school work is filed. Those not filing summer-school units exempt from reexamination in all subjects having grade of 80 per cent.

certificates in the various States—Continued.

UTAH—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None specified.....	No examination required.....		Completion of prescribed courses in school of education of university.
.....do.....	do.....		Discretion of school of education of university.
.....do.....	do.....		Do.
None.....	Examination not necessarily required..		Credentials covering a college course accepted; examination may be required. Also official statement showing he is employed in a high school in the State.
.....do.....	No examination required.....		Graduation from a normal training school of high standard.
.....do.....	State board of education.	State board of education.	Applicant must show that he is proficient in pedagogy and qualified to teach reading, writing, spelling, English grammar, United States history, arithmetic, physiology and hygiene, nature studies, and drawing. In 1911 and thereafter all who have not had 3 years' successful experience in the State must have had 4 years' high-school education or its equivalent to be eligible to enter the examination, and must, in addition, pass a successful examination in psychology and history of education.
.....do.....	do.....	do.....	Same as for county grammar certificate.
.....do.....	No examination required.....		Applicant must give evidence of his ability to pass the regular examination. Application must be indorsed by county superintendent and district board.
Varies.....	City board of examiners.	City board of examiners.	Varies.
.....do.....	do.....	do.....	Do.
.....do.....	do.....	do.....	Do.

VERMONT.

[General laws of the State of Vermont relating to public instruction, in force August 1, 1907 (chaps. 44 and 46), pp. 267-271, 275; Acts of 1908, chap. 37; Acts of 1910, Nos. 61 and 64.]

500 weeks; may be lessened by possession of certain scholastic requirements. (See scholarship requirements.)	No examination required.....	(1) 500 weeks' experience in public schools of State; (2) graduation from approved college and 8 years' experience in State; (3) graduation from a normal school and 200 weeks' experience in State and holder of one 10-year or two 5-year certificates; or (4) holder of first-grade certificate for 10 years, of first and second grade certificates for 12 years, or of second and third grade certificates for 14 years, and 200 weeks' experience in State.
None.....	do.....	Graduation from higher course of a normal school.
.....do.....	do.....	Graduation from lower course of a normal school.

² Cities of 5,000 population or over (4 in 1910).

TABLE 1.—*The principal features of teachers'*

VERMONT—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
First-grade certificate: Upon examination.	State superintendent of education.	State	Any	5 years.....	Renewable for original period after 50 weeks' experience in State.
Without examination.	do.....	do.....	do.....	do.....	Renewable 40 weeks' experience.
Second-grade certificate, upon examination.	do.....	do.....	do.....	2 years.....	Remains in force during employment in same town.
Third-grade certificate.	do.....	State; may be limited to a particular school.	do.....	Not exceeding 1 year.	Issued once only, unless holder has not taught 28 weeks.
Special certificates: First and second grade (in high-school subjects, music, drawing, physical culture, industrial arts and sciences).	do.....	State.....	Subjects named...	First grade, 5 years; second grade, 2 years.	Renewable.
Third grade.....	do.....	Town specified.	Any.....	Not exceeding 1 year.	Not reissued until holder has received first or second grade certificate.
Teacher training-course certificate.	do.....	State.....	do.....	3 years.....	
Primary and kindergarten certificates.	do.....	do.....	Primary and kindergarten grades.	5 years.....	Not reissued until holder has received a certificate upon public examination.
Permits.....	do.....		School specified...	Not exceeding 12 weeks.	Nonrenewable. Can not be given a second time to same person until a certificate has been earned.

*certificates in the various States—Continued.***VERMONT—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
40 weeks.....	State superintendent.	State superintendent.	Satisfactory oral examination. Examination of greater difficulty in subjects required for second grade, and in addition in psychology, English literature, general history, and algebra.
None.....			Graduation from a college approved by State superintendent or of a normal school in another State.
12 weeks.....	State superintendent.	State superintendent.	Examination in reading, writing, spelling, grammar, geography, arithmetic, free-hand drawing, history and Constitution of United States, pedagogy, elementary physiology and hygiene including the effects of alcoholic drinks and narcotics.
.....do.....	do.....	do.....	Same as for second-grade certificate.
Indefinite amount.	No examination required.....		Holder of first or second grade certificate or teacher of special training. Grade of certificate same as grade of previous certificate. In case of special training, State superintendent determines grade.
50 weeks. (See last column.)	do.....		If applicant has held a second-grade certificate or its equivalent, 20 weeks instead of 50 weeks experience is required.
None.....	do.....		Graduate from a teacher-training course; and recommendation of the principal and of the special training teacher of the high school, or academy, in which such course is maintained.
300 weeks in primary grades. (See scholarship requirements.)	do.....		Graduate of recognized kindergarten training school without experience may be granted certificate.
None.....	Town or union superintendent.	Town or union superintendent.	Not more than one-third of the terms taught in any town in 1 year may be taught under permits, provided total terms must not exceed five.

TABLE 1.—*The principal features of teachers'*

VIRGINIA.

[Regulations of the State board of education, 1907, in Virginia School Laws, 1907, pp. 122-128; amended regulations, in Virginia School Laws, 1908, pp. 35-38; and circular of information concerning certification of teachers, No. 63, Mar. 1, 1911.]

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
University certificate.	State board of examiners.	Any school division in State when indorsed by superintendent thereof.	Any.....	12 years.....	From time to time for similar period.
Collegiate certificate.	do.....	do.....	do.....	10 years.....	do.....
Academic certificate.	do.....	do.....	do.....	9, 7, 5, or 3 years.	Nonrenewable.
Professional certificate.	State board of examiners; division superintendent indorses.	do.....	do.....	7 years.....	Renewed for 7 years, provided teacher has been successful and reading course for each year has been completed.
Full normal professional certificate.	do.....	do.....	do.....	10 years.....	Renewable from time to time for similar period.
Normal professional certificate.	do.....	do.....	do.....	7 years.....	do.....
Professional elementary certificates: Grammar grades.	do.....	do.....	Elementary.....	do.....	do.....
Primary grades.	State board of examiners.	Any school division in State when indorsed by superintendent thereof.	do.....	do.....	Renewable from time to time for similar periods.

¹ The course must cover the following subjects: Principles of teaching, including how to study; methods of teaching arithmetic, civics and history, geography, language, reading and literature; hygiene, drawing, practice teaching or advanced observation; and elementary agriculture and school gardening, or manual training and domestic economy.

certificates in the various States—Continued.

VIRGINIA.

[Regulations of the State board of education, 1907, in Virginia School Laws, 1907, pp. 122-128; amended regulations, in Virginia School Laws, 1908, pp. 35-38; and circular of information concerning certification of teachers, No. 63, Mar. 1, 1911.]

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None specified.....			Holder of a degree from the graduate school of a registered university.
do.....			Holder of a baccalaureate degree from a registered college.
do.....			Graduation from an institution which does not fully comply with definition of a college but which offers an approved four-year course in literature and science at least 1 year in advance of the standard 4-year high school. Each additional year of high school above 1 year required for admission adds 2 years to the duration of the certificate given its graduates.
do.....	State board of examiners when examination is required.	State board of examiners when examination is required.	Diploma of graduation from normal course of State university, State normal, and other specified institutions.
do.....			Completion of course leading to a full diploma in the State normal school at Farmville, Harrisburg, or Fredericksburg.
do.....			Completion of course leading to a professional certificate in either of above State normal schools.
9 or 6 months (see last column).			(1) Holder of first-grade with 9 months' experience or of high-school certificate with 6 months' experience; and (2) completion of a prescribed course in the State normal schools during the regular term or in the summer sessions. Equivalent courses in other normal schools are given same credit. Course may be completed in a term of 1 year, or in two sessions of 6 weeks each, or in three sessions of 4 weeks each. In the second case the work must be completed within 4 years; in the last, within 5 years. ¹
9 months in primary or grammar grades.			Same as for grammar-grade certificate except experience (which see) and course of study. ²

² The course must include principles of teaching, with special emphasis on how to study; primary methods in reading, language, arithmetic, physical nature study, and home geography; hygiene, music and games, primary industrial work, drawing and observation work, and practice teaching.

TABLE 1.—*The principal features of teachers'*
VIRGINIA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Summer school professional certificate.	State board of examiners.	Any school division in State when indorsed by superintendent thereof.	Elementary	7 years	Renewable if professional reading course has been pursued.
High-school certificate.	do.....	do.....	do.....	1 year.....	May be extended. ¹
Normal training certificates.	do.....	do.....	In 1 and 2 room schools.	3 or 2 years..	Nonrenewable
Special certificates (including also kindergarten and higher branches).	do.....	do.....	Subjects named...	5 years.....	Renewal be from time to time for similar period. Professional reading course required.
First-grade certificate: Upon examination.	do.....	do.....	Any	do.....	Renewable 2 or 5 years; 3 years' successful experience, completion of prescribed reading.
Without examination (1).	do.....	do.....	do.....	do.....	Renewable indefinitely so long as reading course is pursued.
Without examination (2).	do.....	do.....	do.....	4 years.....	Same as first grade on examination.
Without examination (3).	do.....	do.....	do.....	2 years.....	Nonrenewable.
Second-grade certificate.	do.....	do.....	do.....	do.....	Renewable for 1 year; 1 year's successful experience and completion prescribed reading course.

¹ May be extended provided holder (1) pursues professional course of study and passes examinations in 2 subjects thereof each year; or (2) passes in 2 courses in the summer school of the University of Virginia, or one of like grade; or (3) passes required number of subjects in examination for a professional certificate.

certificates in the various States—Continued.

VIRGINIA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
9 or 6 months. (See last column.)			Holder of first-grade or of a high-school certificate who has taught 6 months, and who has attended summer schools of University of Virginia or another of equal rank for 2 sessions of 6 weeks each, and has made a grade of at least 75 per cent in both class work and examination in 6 courses in other than the elementary subjects and in at least 4 different subjects, 1 of which shall be English and another education. The other 4 courses may be taken from the following groups (not more than 2 courses may be from 1 group): Industrial education, science, mathematics, history, education and philosophy, and language.
None			Graduation from 4-year high-school course of study, approved by board of examiners; indorsement by division superintendent.
do.			Graduation from a 4-year high-school course in which the training-class work is taken in the last year and based on preceding 3 years' work. Graduates from 3-year high-school course in which training-class work is based on preceding 2 years' work receive 2-year certificates.
See last column.	State board of examiners when examination is required.	State board of examiners when examination is required.	(1) Holder of valid first-grade certificate or equivalent thereof (but exception may be made in the cases of music, drawing, and domestic sciences), who has attended the University of Virginia summer school for 2 sessions of 6 weeks each and completed at least 1 course in educational psychology and 3 courses in any one subject in the university department will be given certificate to teach such subject. (2) Graduation from kindergarten department of a State normal or other recognized kindergarten training school and evidence of required scholarship. (3) Examination in higher branches which applicant desires to teach unless he is a graduate of a university or college of approved standing.
9 months	State board of examiners.	State board of examiners.	Examination in subjects required for a second-grade certificate and in algebra (through quadratics), one branch of science (either physical geography, physics, or agriculture), and one division of history (either general or English), with a minimum average of 85 per cent and grade of 70 per cent.
6 years' successful experience immediately prior to July, 1907.			Holder of first-grade certificate for 6 years immediately prior to July, 1907, and recommendation of division superintendent.
9 months under second grade.			Holder of examination credits required for first grade, but who was given second-grade certificate because of lack of experience.
None			Completion of certificate course at State normal school.
do.	State board of examiners.	State board of examiners.	Examination in subjects required for third-grade certificate and in drawing and theory and practice of teaching, with minimum average of 75 per cent and grade of 60 per cent.

TABLE 1.—*The principal features of teachers'*
VIRGINIA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Third-grade certificate.	State board of examiners.	Any school division in State when indorsed by superintendent thereof.	Any, when no teachers holding first or second grade certificates are available.	1 year.....	Nonrenewable. Granted once to same person.
Fourth-grade certificate.	do.....	do.....	Any colored school	2 years.....	do.....
Summer school certificate—first grade.	do.....	do.....	do.....	5 years.....	Renewable from time to time for similar period.
Provisional certificates.	do.....	do.....	Depends on grade of certificate issued.	1 year.....	Nonrenewable.
Emergency certificate.	do.....	Special school that can not otherwise secure a teacher.		Until a licensed teacher can be secured.	do.....

WASHINGTON.

[Code of Public Instruction, 1909, pp. 84-91; Session Laws, 1909, chap. 97, Acts 1911, H. B. 80.]

Life certificate.....	State superintendent.	State registration in county required.	Any.....	Life.....	
Permanent certificates:					
(a) Professional.....	do.....	do.....	do.....	do.....	
(b) First grade.....	do.....	do.....	do.....	do.....	
(c) First grade, primary.....	do.....	do.....	Primary grades.....	do.....	
Professional certificate.	do.....	do.....	Any.....	5 years.....	Renewable (a) 1 year's attendance higher institution completing 3 subjects; (b) 24 months' teaching. Any renewal may be renewed.

¹ The course must cover at least three terms of four weeks each or two terms of six weeks each, and must occupy a minimum of 240 recitation periods of 40 minutes each. It includes the following subjects: The common branches; methods of teaching reading to beginners; hygiene, public and private; civics, with

certificates in the various States—Continued.

VIRGINIA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	State board of examiners.	State board of examiners.	Examination in orthography (including punctuation), reading, writing, arithmetic (including business forms), grammar, geography, United States history, history of Virginia, civil government (including Virginia), and physiology and hygiene, with a minimum average of 65 per cent and grade of 50 per cent.
...do.....	...do.....	...do.....	Negro applicants who make an average of 50 per cent with no branch below 40 per cent on third-grade subjects.
9 months.....			Completion of prescribed course at Hampton or Petersburg within a period of 5 years by holder of second-grade or higher certificate. ¹
See last column.....			A teacher holding a certificate who did not take spring examination, but attended a State summer normal school for 20 days, and passed on at least one-half of the subjects, including arithmetic and grammar, is given such provisional certificate as the grades warrant. When other branches are passed, full certificate bears same date as original. A teacher who attended a summer institute and made required grades in one-half of subjects for either first or second grade certificate, and satisfied all other requisites, is granted a provisional certificate, which can not be renewed. Provisional certificates of the third and fourth grades are not issued.
None.....	No examination required.....		Recommendation of a division superintendent.

WASHINGTON.

[Code of Public Instruction, 1909, pp. 84-91; Session Laws, 1909, chap. 97, Acts 1911, H. B. 80.]

45 months; 27 months in State.	State board of education.	State superintendent.	Credits required for professional certificates and examination in psychology, history of education, bookkeeping, composition, general history. Other subjects may be substituted.
72 months; 36 in State.	...do.....	...do.....	Holder of professional certificate for at least 18 months. Indorsement of county superintendent.
...do.....	...do.....	...do.....	Holder of first-grade certificate for at least 18 months. Indorsement of county superintendent.
...do.....	...do.....	...do.....	Holder of first-grade primary certificate for at least 18 months. Indorsement of county superintendent.
24 months; 8 in State.	...do.....	...do.....	All requirements of a first-grade certificate, also examination in plane geometry, geology, botany, zoology, civil government. Other subjects may be substituted in lieu of any or all of these by State board upon request of applicant.

special reference to community life; agriculture, principles of teaching; and any three of the following: Sewing, cooking, bench work, poultry raising, and household handicrafts, including glazing, mending tinware, whitewashing, chair caning, and cobbling.

TABLE 1.—*The principal features of teachers'*
WASHINGTON—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
University life diploma.	Regents upon recommendation of faculty.	State.....	Any	Life.....	.....
University normal diploma.	do.....	do.....	do.....	5 years.....	.....
State college life diploma.	do.....	do.....	do.....	Life.....	.....
State college normal diploma.	do.....	do.....	do.....	5 years.....	.....
Normal-school life diploma.	Normal school.....	do.....	do.....	Life.....	.....
Normal-school diploma.	do.....	do.....	do.....	5 years.....	.....
Secondary normal-school certificate.	do.....	do.....	do.....	3 years.....	Nonrenewable.
Elementary normal-school certificate.	do.....	do.....	Elementary.....	2 years.....	do.....
First-grade certificate.	State superintendent.	do.....	Any.....	5 years.....	Same as professional.
First-grade primary certificate.	do.....	do.....	Primary.....	do.....	do.....
Second-grade common-school certificate.	do.....	do.....	Any.....	2 years.....	Renewable (a) Semester's attendance higher institution, or 1 summer session 6 weeks; satisfactory standing in 3 subjects; (b) 16 months' successful teaching.
Third-grade common-school certificate.	do.....	do.....	do.....	1 year.....	Renewable. 1 year's attendance higher institution secures second-grade certificate.
City certificates: ¹ High school.....	Board of directors.	City.....	do.....	do.....	Fixed by regulations of board of directors.
Grammar school.....	do.....	do.....	Grammar or primary school as teacher; primary school as principal.	do.....	do.....
Primary.....	do.....	do.....	Primary school as teacher.	do.....	do.....

¹ Cities having over 100 teachers (4 in 1910).

certificates in the various States—Continued.

WASHINGTON—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
24 months.....			12 semester hours in department of education and graduation in liberal arts course.
None.....			Do.
24 months.....			Do.
None.....			Do.
3 years.....			Completion of advanced course in a State normal school.
None.....			Completion of advanced course in a State normal school and demonstrated ability to teach and govern by successful practice in training department of 18 weeks.
do.....			Completion of secondary course and practice teaching as required for normal-school diploma.
do.....			Completion of elementary course in a State normal school.
9 months.....	State board.....	State superintendent.	Must pass the examination in all subjects required for a second-grade certificate, and in algebra, physics, literature, and physical geography. Substitutes for two subjects allowed.
45 months in primary grades.	do.....	do.....	Credits in subjects for second-grade certificate and examination in nature study, drawing, literature, and physical geography. Substitutes for two subjects allowed.
None.....	do.....	do.....	Credits in subjects for third-grade certificates and examination in music. May be granted once to teachers from other States with 10 years' successful experience; examination in State manual only required.
do.....	do.....	do.....	Examination in reading, grammar, penmanship, and punctuation, United States history, geography, arithmetic, physiology and hygiene, theory and art of teaching, orthography, and Washington State manual.
Fixed by regulations of board of directors.	Board of examiners.	Board of examiners.	Must pass examination required for grammar certificates and, in addition, in civil government, physical geography, elementary physics, algebra, botany, and such other subjects as board of directors may determine.
do.....	do.....	do.....	Applicant must have been found "upon examination to have a practical knowledge of pedagogics, school management, and the general school system of the State of Washington, and to be proficient in and qualified to teach the following branches: Reading, writing, spelling, English grammar, geography, arithmetic, physiology and hygiene, United States history, and such other English branches as board of directors may prescribe."
do.....	do.....	do.....	Same as for city grammar school certificate.

TABLE 1.—*The principal features of teachers'*
WASHINGTON—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Special certificate..	County or city superintendent.	County or city.	Special subjects...	Indefinite—so long as holder teaches.	.....
Temporary certificate. ¹					

WEST VIRGINIA.²

[Rev. School Laws of W. Va., 1908, pp. 41-46, 56-59; Acts of W. Va., 1909, pp. 350-352. Handbook relating to examination for teachers' certificates, Department of free schools, W. Va., 1910. Acts 1911, S. B. 139.]

First-class State professional certificate.	State board of education.	State.....	Any.....	12 years.....	Renewable for like period, if holder has taught 8 years under original.
Second-class State professional certificate: Upon examination.	do.....	do.....	do.....	6 years.....	Renewable as first-class State professional certificate, provided holder has taught 4 years thereon, otherwise 6 years.
Without examination.	do.....	do.....	do.....	do.....	do.....
Graduates' certificate.	State superintendent.	do.....	do.....	5 years.....	Renewable for 5 years.
High-school teachers' certificate.	do.....	do.....	do.....	do.....	Renewable 5 years, if taught 1 year.
Primary teachers' certificate.	do.....	do.....	Primary grades.....	do.....	Same as first-grade uniform certificate.

¹ Temporary certificates shall be issued in accordance with the rules and regulations of the State board of education.

² See appendix, p. 258.

certificates in the various States—Continued.

WASHINGTON—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	County or city superintendent.	County or city superintendent.	Must show "by examination or otherwise satisfactory evidence of fitness to teach special subjects." No limitation placed upon subjects for which certificates may be granted.

WEST VIRGINIA.

[Rev. School Laws of W. Va., 1908, pp. 41-46, 56-59; Acts of W. Va., 1909, pp. 350-352. Handbook relating to examination for teachers' certificates, Department of free schools, W. Va., 1910, Acts 1911, S. B. 139.]

4 years under second-class State professional.	No examination required.....		
3 years.....	State board of education.	State board of education.	Holder of first-grade uniform certificate or equivalent. Examination in educational psychology and method; history of education and school management; rhetoric and composition; English and American literature; algebra; and in five other subjects. ³
3 years under first-grade uniform certificates, 1 year immediately preceding.	do.....	do.....	Graduation from State university or State normal school and its branches or other school whose grade of work is considered equal in all respects to the work of the state normal school.
None.....	No examination required.....		Graduation from West Virginia University including six courses in education; from normal department of State normal school and its branches; from normal department of any other school in State which in the judgment of the State board of education is equivalent in amount, kind, and quantity to that of the State normal school; or from normal department of the West Virginia Colored Institute.
.....do.....	State board of education.	State board of education.	Same as for second-class State professional certificate.
2 years under first or second grade uniform certificate.	do.....	do.....	Examination in elementary literature, child study, and school management, school hygiene and sanitation, primary reading, number work, nature study, and in two of following subjects: History for children, story-telling, drawing, and music. "This certificate is designed for those who have made special preparation for primary work." Minimum average, 85 per cent; minimum grade, 65 per cent.

³ Applicant must choose five of the following subjects: American history and civics; English, ancient, and mediæval history; Latin, through Virgil; Greek, through Xenophon; German, 2 years; French, 2 years; plane geometry; solid geometry; trigonometry; physics; chemistry; physical geography; botany; agriculture; zoology; physiology; and elementary geology. Minimum average, 85 per cent; minimum grade, 65 per cent.

TABLE 1.—*The principal features of teachers'*
WEST VIRGINIA—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
First-grade graded school certificate.	State superintendent.	State	In rural and graded schools; and in high schools, if local authorities agree.	5 years.....	Renewable once for like period if holder has taught 1 year thereon, or has served as county superintendent while certificate was in force. Examination in agriculture, if original did not include this subject.
Second-grade graded school certificate.	do.....	do.....	do.....	3 years.....	Nonrenewable.
Third-grade graded school certificate.	do.....	do.....	do.....	1 year.....	Not issued more than 2 years in succession to same applicant.
First-grade elementary school certificate.	do.....	do.....	In 1-room schools and in graded schools up to and including the room in which the third reader is taught.	5 years.....	Same as first-grade graded school certificate.
Second-grade elementary school certificate.	do.....	do.....	do.....	3 years.....	Nonrenewable.
Third-grade elementary school certificate.	do.....	do.....	do.....	1 year.....	Issued not more than twice to same person in 2 years.
Kindergarten certificate. ¹	do.....	do.....	do.....	do.....	do.....
Emergency certificates.	State superintendent.	County designated.	According to grade of certificate.	Until June 30 following issuance.	Nonrenewable. Issued only once to same person.

WISCONSIN.

[Laws of Wis., relating to common schools, 1909, pp. 71-90, 106, 161, 198-199.]

Unlimited State certificate: Upon examination.	State superintendent.	State.....	Any.....	Life.....
Without examination.	do.....	do.....	do.....	do.....

¹ "No person may be employed as a teacher in a regularly established kindergarten unless she holds a diploma from a kindergarten college, or, in addition to holding such a certificate as is required of other persons employed as teachers in the schools of this State, be duly examined in kindergarten methods and theories in such manner as the board of education which establishes said kindergarten may prescribe."

certificates in the various States—Continued.

WEST VIRGINIA—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	State superintendent.	State superintendent.	Same as for first-grade elementary certificate, and examination in general history and single-entry bookkeeping.
do.....	do.....	do.....	Same as for second-grade elementary certificate; and examination in general history and single-entry bookkeeping.
do.....	do.....	do.....	Same as for third-grade elementary certificate; and examination in general history and single-entry bookkeeping.
do.....	do.....	do.....	Examination in orthography, reading, penmanship, arithmetic, English grammar and language, physiology and hygiene, United States history, State history, geography, civil government, agriculture, and theory and art of teaching. Minimum average, 90 per cent; minimum grade, 75 per cent.
do.....	do.....	do.....	Same as for first-grade elementary certificate, except minimum standing, 80 per cent and 68 per cent.
do.....	do.....	do.....	Same as for first-grade elementary certificate, except minimum standing, 70 per cent and 60 per cent.
None.....	No examination required		Issued on recommendation of county superintendent. State superintendent determines grade of such certificate.

WISCONSIN.

[Laws of Wis., relating to common schools, 1909, pp. 71-90, 106, 161, 198-199.]

24 months.....	State board of examiners.	State board of examiners.	Examination in subjects required for a limited certificate, and in addition in botany, political economy, history of education, zoology, chemistry, or astronomy. Latin may be substituted for English literature.
1 year after graduation; 2 years, if from institution outside State.			Holder of Wisconsin University or normal school diploma and graduate's license. University course must have included completion of pedagogical work.

TABLE 1.—*The principal features of teachers'*

WISCONSIN—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Limited State certificate: Upon examination.	State superintendent.	State	Any	5 years.....	None.....
Without examination.	do.....	do.....	Any, except as principal of 4-year high school.	do.....	do.....
University, college, and normal-school graduate's license.	do.....	do.....	do.....	1 year; 2 years if from institution outside State.	See unlimited and limited certificates without examination.
Unlimited special certificate.	do.....	do.....	Subjects specified.	Life.....	
Special certificate.	do.....	District specified.	One subject, as specified.	Varies.....	Renewed for not more than 1 year upon recommendation of State board.
Unlimited State kindergarten certificate.	do.....	State.....	Kindergarten or first three grades.	Life.....	
State kindergarten license.	State superintendent.	State.....	Kindergarten or first three grades.	1 year.....	See unlimited State kindergarten certificate.
Unlimited State manual-training certificate. ¹					
Unlimited State domestic-science certificate. ¹					
State manual-training license. ²					
State domestic-science license. ²					
High-school teacher's certificate.	State superintendent.	Varies.....	Branches specified	Varies; life or 5 years.	5-year certificate is non-renewable.
Emergency high-school principal's certificate.	do.....	Locality designated.	High-school principal.	1 year.....	Renewed for not more than 1 year, upon recommendation of State board.
Milwaukee high-school diploma. ⁴	do.....	State.....	Any.....	Life.....	
Special license.....	do.....	District specified.	School specified...	Next meeting of State board of examiners.	Renewed on recommendation of State board of examiners

¹ Same as for unlimited State kindergarten certificates upon completion of a like technical course, except 2 years' experience required of graduates of private schools.² Same as for State kindergarten license upon completion of a like technical course, except granted for 2 years to graduates of private schools

certificates in the various States—Continued.

WISCONSIN—Continued.

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
12 months.....	State board of examiners.	State board of examiners.	Examination in subjects required for a first-grade certificate, and in addition in mental philosophy, English literature, and psychology.
1 year after graduation; 2 years, if from institution outside State.			Holder of normal school elementary certificate and a graduate's license.
None.....	No examination required.....		Holder of certificate from president of university showing completion of pedagogical course or holder of certificate from president of a State normal school showing completion of full or elementary course or from institution giving equivalent courses located either within or without the State.
	State board of examiners.	State board of examiners.	Vary to meet conditions under which applicant desires to teach. More especially for high-school positions and principalships of State graded schools.
	do.....	do.....	Vary to meet conditions under which applicant desires to teach.
1 year after graduation; 2 years if from institution outside State.	No examination required.....		Holder of State kindergarten license issued under conditions described below; or satisfactory proof of equal knowledge and ability.
None.....	No examination required.....		Holder of a diploma from a State normal school or from a private normal school of equivalent rank who has completed kindergarten training course.
None.....	State superintendent.	State superintendent.	This certificate is issued only for such branches as are not covered by local certificates, usually for life.
do.....	do.....	do.....	This certificate is issued to a superintendent of schools who has been elected principal of the high school in the same system. No requirements are specified. ³
5 years.....	do.....	do.....	Such examination as to moral character, learning, and ability to teach as State superintendent deems proper and reasonable. When diploma is countersigned, it has effect of unlimited State certificate.
Must meet requirements of one kind of certificate issued by State superintendent.	No examination required.....		Granted only for urgent reasons. Must satisfy State superintendent of possession of scholarship requirements for one kind of certificate issued by him.

³ This statute was enacted for the purpose of enabling a quick adjustment of an emergency situation. It is seldom necessary to resort to its provisions.

⁴ This provision of the law is practically inoperative. But one diploma has been countersigned in the past 7 years. The normal department of the Milwaukee high school was abolished in 1875.

TABLE 1.—*The principal features of teachers'*
WISCONSIN—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
County superintendents' certificate.	State superintendent.	State.....	Elementary schools. ¹	Until revoked.	.....
First-grade certificate.	County, district, or city superintendent. ²	County, superintendent's district, or city; can not be indorsed in another county, district, or city. ³	do.....	5 years.....	Renewable one or more times if holder has taught 10 years. Counter signature of a diploma from a free high school held by holder, equivalent to renewal for 5 years.
Second-grade certificate.	do.....	do.....	Elementary schools.	3 years.....	Renewable if holder has taught 2 years and attended professional schools 6 weeks, receiving credits in two subjects.
Third - grade certificate.	County, district, or city superintendent.	County, superintendent's district, or city; can not be indorsed in another county, district, or city. ³	Elementary schools.	1 year.....	Renewable (1) if holder attends professional schools 6 weeks. Not more than three to one person, or (2) if satisfactory standings are secured in two of additional subjects required for second-grade certificate.
Special third-grade certificate.	do.....	do.....	Elementary schools. (May be limited to a particular rural school or a department thereof.)	Not more than 1 year.	Not more than one issued to same person.
First-grade kindergarten certificate.	do.....	do.....	Kindergarten.....	4 years; or 1 year, and 3 years after 6 months' teaching.	Nonrenewable.
Second-grade kindergarten certificate.	do.....	do.....	do.....	2 years.....	do.....

¹ Holder may teach in a high school any of the branches covered by the certificate, or may serve as principal of a State graded school of the second class, if granted a special license.

² 67 cities in 1910.

*certificates in the various States—Continued.***WISCONSIN—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
8 months.....	State board of examiners.	State board of examiners.	Examination in subjects required for a first-grade certificate and in school law, and the organization, management, and supervision of district schools.
.....do.....	County, district, or city superintendent.	County, district, or city superintendent.	Examination in all subjects required for second-grade certificate, and, in addition, English literature, theory and art of teaching, algebra, physics, and English history. ⁴
.....do.....	do.....	do.....	Examination in subjects required for third-grade certificate, and, in addition, physical geography, American literature, English composition, and cataloguing and use of school libraries. ⁴
None.....	County, district, or city superintendent.	County, district, or city superintendent.	Examinations in orthoepy, spelling, reading, penmanship, arithmetic, elementary composition and grammar, geography, history of United States and civil government of the United States and of Wisconsin, physiology and hygiene with special reference to stimulants and narcotics, school management, manual of elementary course of study for common schools of Wisconsin, elements of agriculture. Applicant must have attended a professional school for teachers at least 6 weeks, and also received in such school standings in school management and in methods of teaching reading and language, arithmetic, and geography. Standard to be adopted by each county superintendent and approved by State superintendent—must be higher for first than second and higher for second than for third grade certificates. ⁴
.....do.....	do.....	do.....	Issued only when supply of legally qualified teachers is exhausted, and only to as many persons as are required. Same examination as for third grade.
.....do.....	do.....	do.....	Examination in subjects required for second-grade kindergarten certificate and, in addition, in history of education as related to the development of the kindergarten and in the elements of zoology.
.....do.....	do.....	do.....	Examination in subjects required for third-grade kindergarten certificate, and in general literature and elements of botany.

³ Certificates may be issued by a county superintendent upon papers of an examination held in another county. Must be of same grade as original certificate and coterminous with it.

⁴ Standings in State normal schools and county training schools may be accepted by county superintendents and other officers in lieu of examination in these subjects.

TABLE 1.—*The principal features of teachers'*
WISCONSIN—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Third-grade kindergarten certificate.	County, district, or city superintendent.	County, superintendent's district, or city, unless limited; can not be indorsed in another county, district, or city. ¹	Kindergarten.....	1 year or less.	Nonrenewable.
County training-school certificate.	County training-school board.	Same as for first-grade certificate. ¹	Elementary schools.	3 years, or may be limited to 1 year.	1-year certificate extended after 8 months' experience.
Special certificate..	City superintendent.	City.....	Branches specified.	1 year.....	Nonrenewable.
Temporary certificate. ²					

WYOMING.

[School Laws, 1909, 122-130. Session Laws, 1909, chap. 33.]

Professional first-class certificate: Upon examination.	State superintendent.	State.....	Any school; superintendent or principal of any school.	Life.....	
Without examination.	do.....	do.....	do.....	do.....	
Professional second-class certificate: Upon examination.	do.....	do.....	Any school; superintendent or principal of any school having not over 2-year high-school course.	do.....	
Without examination.	do.....	do.....	do.....	do.....	
First-class certificate: Upon examination.	do.....	do.....	Any elementary school, assistant in high school for subjects covered in examination, superintendent or principal of schools having no high school.	4 years.....	Renewable upon completion of reading-circle course; not longer than term of certificate nor more than 2 years at a time.
Without examination.	do.....	do.....	do.....	do.....	do.....

¹ Certificates may be issued by a county superintendent upon papers of an examination held in another county. Must be of same grade as original certificate and coterminous with it.

*certificates in the various States—Continued.***WISCONSIN—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None	County, district, or city superintendent.	County, district, or city superintendent.	Examination in orthoepy, orthography, reading, writing, arithmetic, English grammar, physiology, and hygiene with special reference to childhood, drawing, music, juvenile literature, theory and art of kindergarten teaching.
None for 1-year limited certificate; 8 months for 3-year certificate.	.....	.....	Completion of prescribed course in a county training school for teachers.
None	City superintendent.	City superintendent.	Examination provided by city school board and approved by State superintendent.

WYOMING.

[School Laws, 1909, 122-130. Session Laws, 1909, chap. 33.]

3 years.....	State board of examiners.	State board of examiners.	Holder of a professional second-class certificate and an examination in advanced psychology and school supervision.
None or 2 years (see last column).	.....	.....	Graduation from University of Wyoming with major in psychology and pedagogy amounting to one-fifth entire course; or examination in professional subjects for second-class certificate and 2 years' successful experience.
2 years.....	State board of examiners.	State board of examiners.	Examination in subjects required for first-class certificates and 2 additional subjects elected from following: School management, pedagogy, methods, and history of education. Minimum average 80 per cent, grade 60 per cent.
1 year.....	.....	.....	Graduation from State normal school of University of Wyoming, or other school of equivalent rank, as determined by State board of examiners.
.....do.....	State board of examiners.	State board of examiners.	Examination in subjects required for second grade and, in addition, elementary algebra, English and American literature, elementary psychology, physical geography, and two or more of following: Plans geometry, botany, zoology, chemistry, general history, Latin, German, political economy, bookkeeping, and shorthand. Minimum average 80 per cent, grade 60 per cent.
.....do.....	.....	.....	Graduation from the preparatory school of the University of Wyoming or from a 4-year high-school course, and 1 year in normal course at university.

² Temporary certificates may be issued by county, district, and city superintendents with the consent of the State superintendent.

TABLE 1.—*The principal features of teachers'*
WYOMING—Continued.

Name of certificate.	Issued by—	Valid in—		Duration.	Persistence.
		Territory.	Schools.		
Second-class certificate: Upon examination.	State superintendent.	State.....	Elementary schools.	2 years.....	Renewable upon completion of reading-circle course; not longer than term of certificate nor more than 2 years at a time.
Without examination.	do.....	do.....	do.....	do.....	do.....
Third-class certificate: Upon examination.	do.....	do.....	do.....	1 year.....	Nonrenewable.
Without examination.	do.....	do.....	do.....	do.....	do.....
Special primary certificate.	do.....	do.....	Primary and kindergarten.	4 years.....	Reissued upon examination.
Special technical certificate: Upon examination.	do.....	do.....	Technical subjects	do.....	do.....
Without examination.	do.....	do.....	do.....	do.....	Renewable for life to graduates of technical school of University of Wyoming (see last column).
Diploma certificate.	do.....	do.....	(See last column).	(See last column.)	(See last column.)
Temporary certificate.	do.....	do.....	Any.....	Until next examination (see last column).	Renewable only under exceptional circumstances (see last column).
Permit.....	County superintendent.	County.....	do.....	do.....	do.....

*certificates in the various States—Continued.***WYOMING—Continued.**

Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
None.....	State board of examiners.	State board of examiners.	Examination in subjects required for third-class certificates and, in addition, rhetoric and composition, and theory and practice of teaching. Minimum average 80 per cent, grade 60 per cent.
.....do.....			Same as first class (without examination), except 18 weeks in normal course.
.....do.....	State board of examiners.	State board of examiners.	Examination in orthography, reading, penmanship, arithmetic, English grammar, geography, United States history, civil government of United States and of Wyoming, and physiology and hygiene. Minimum average 70 per cent, grade 50 per cent.
.....do.....			Same as first class (without examination), except no normal course required.
4 years.....	State board of examiners.	State board of examiners.	Two certificates of as high class as second grade and an examination in primary and kindergarten methods, elementary psychology, methods, and school management. Minimum average 75 per cent, grade 60 per cent.
None.....	do.....	do.....	Examination in special branches applicant expects to teach.
.....do.....			Graduation from technical school of University of Wyoming. Renewable for life if holder passes examination in professional subjects required for second-class professional certificate.
(See last column).....			Granted to graduates of State normal school and of college of liberal arts of University of Wyoming for period necessary for them to gain experience required for life certificate. Granted also to graduates of other normal schools and colleges of equivalent rank, as determined by board of examiners.
None.....	No examination required.....		Applicant must have been engaged to teach and a member of school board engaging him must have forwarded request for granting of such certificate indorsed by county superintendent.
.....do.....	No examination required.....		Issued by county superintendent until such time as State board of examiners can act upon application for temporary certificate.

NUMBER OF CERTIFICATES.

The table given on page 153 shows the number of different kinds of certificates, the number of certificates issued by central, county, and local agencies, and the number of certificates issued by each class of agencies that are valid in State, county and town or district.

The States in the South Atlantic Division issue fewer kinds of certificates than the States in the other groups; the States of the South Central group are next in order, then the North Atlantic and the Western, while the North Central States have the largest number of certificates in their schemes of certification. The medians or averages for these groups are 7, 10, 11, 11, and 14, respectively, while the median number of certificates for all the States is 11. One-half of the States issue from 8 to 15 certificates each.

Of the total number of different kinds of certificates issued by the several States, amounting in all to 588, 68 per cent are issued by central agencies (State officers or educational institutions), 24 per cent by county boards and superintendents, and 8 per cent by local

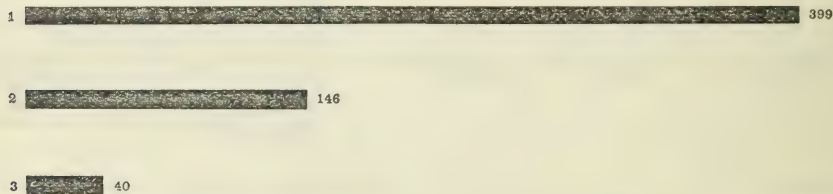


FIGURE 2.—Number of certificates issued by central, county, and local agencies: 1, central agencies; 2, county agencies; 3, local agencies.

agencies. The number of city certificates given in the table are those provided for in the laws. But the laws are frequently so framed as to permit the multiplication of the number provided for by the issuance of several certificates under the head of each named in the laws. Thus in Nebraska 4 are mentioned in the law and 17 are issued. It would be practically impossible to ascertain the number of different kinds of city certificates actually issued in all of the States.

These figures are an illuminating commentary upon the extent to which centralization in the authority to grant licenses to teach has occurred. However, it must not be inferred from this that even a majority of the teachers in the United States are holding certificates issued by State authority. The large number of rural teachers holding certificates of the lower grades in States where county or town superintendents issue the certificates is sufficient to bring the number holding certificates issued by State authority below one-half the entire number of teachers. It is true in all probability, nevertheless, that the certificates of over one-half of the teachers

have met the requirements of the State offices at some stage in the process of securing a certificate, if not in the issuance, then in the grading or most probably in the preparation of the examination questions and in the regulations governing the examinations. As only 4 States give the county superintendents full authority in all these matters, and only 4 others do the same for the town superintendents, it is likely that from 85 to 95 per cent of the certificates now in force in the United States have been shaped, in part at least, by State education officers.

NAMES OF CERTIFICATES.

Each State has employed its own set of terms to designate its certificates. In many States the names were not given at one time but were evolved during a long period of time to meet differing conditions. In other States a nomenclature has been adopted at the time of a revision, as in New Jersey, Indiana, and California. But, taking the country as a whole, a very great variety of terms is used. The word "license" is used instead of "certificate" in a fairly large proportion of the States, but notwithstanding "license" is the more precise term, it is not nearly so prevalent. The highest certificate in some States is called a "diploma," and the word "permit" has been adopted in a number of States for the temporary certificate. In Connecticut there are "statutory" and "honor" certificates and "certificates of special preparation."

Commonly a certificate is designated by the extent of territory which it covers, the kind of school in which it is valid, or the number of years or months for which it is granted. The terms "State certificates," "county certificates," "life certificates," and "primary certificates" are familiar to all teachers. Frequently a combination of these terms is made, as "State life certificate," "State primary certificate," "36-months' certificate." Differentiation between certificates of the same general class are also made, as "first-grade county," "second-grade county," etc., which are alike in the kinds of school and in the territory in which they are valid, but differ in duration. Permanent and provisional, or probationary, certificates constitute a similar distinction. Finally, in certain States the term "professional" is used for a higher grade of certificate.

Because of the heterogeneity in the naming of certificates, it is usually impossible for a person not acquainted with the State systems to know by their names the provisions of the certificates. For example, what rights are conferred upon a holder of a first-grade certificate in Alabama, a professional certificate in Montana, a college certificate in Michigan, or an academic certificate in New York? A uniform nomenclature is needed for all the States, or at least the adoption of principles which shall control the naming of certificates

AGENCIES THAT ISSUE CERTIFICATES.

Certificates to teach are issued by State, county, and district (city and town) education officers. In certain States all of the certificates are issued by the officers of one of these units of government, but it is much more common to find two or even all three of these classes of officers represented in the scheme of administration, the terms "State certificates," "county certificates," and "city certificates" being used to designate the classes of certificates issued by each. Within each of these classes of education officers, each State almost invariably makes one office most prominent, that of the board of education, the board of examiners, or the superintendent. The following list shows the number of States in which each of these offices predominates in each class:

STATE.		States.
State board of education.....		16
State board of examiners.....		9
State superintendent.....		22
COUNTY.		
County board of education.....		2
County board of examiners.....		5
County superintendent.....		22
LOCAL (city, town).		
City or town board of education.....		10
City or town board of examiners.....		6
City or town superintendent.....		4

States differ widely in the distribution of the certificating power among these various classes of officers. No less than five distinct systems of administrative organization exist. They are (1) the State system, (2) the State-county system, (3) the State-county local system, (4) the State-local system, and (5) the county system. A sixth, the local or town system, might also be said to exist if we throw aside the certificates granted superintendents of union districts in Massachusetts, as all the other certificates to teach issued in that State are given by the town school committees or boards of education. Delaware is the only State in the Union in which all the certificates are issued by the county authorities, but even there the State board of education issues regulations for the guidance of the county superintendents. In 6 States, certificates are issued by both State and local officials; in 8 States the authority is distributed among the State, county, and local officers; in 16, between the State and county officers only, while in as many as 17 States practically the entire certificating power is lodged in the State officers.

The following list enumerates the States having each of the above-named administrative systems for the issuance of licenses to teach:

STATE SYSTEM.

North Atlantic: Vermont, Rhode Island, New Jersey.
 South Atlantic: Virginia, West Virginia.
 South Central: (None.)
 North Central: Iowa, North Dakota, Minnesota, Nebraska, South Dakota.
 Western: Wyoming, Arizona, Utah, Nevada, Idaho, Washington, Oregon.

STATE-COUNTY SYSTEM.

North Atlantic: (None).
 South Atlantic: Maryland, North Carolina, South Carolina, Georgia, Florida.
 South Central: Kentucky, Tennessee, Mississippi, Louisiana, Arkansas, Oklahoma.
 North Central: Indiana, Illinois, Missouri.
 Western: Montana, Colorado.

STATE-COUNTY-LOCAL SYSTEM.

North Atlantic: New York, Pennsylvania.
 South Atlantic: (None.)
 South Central: Texas.
 North Central: Ohio, Michigan, Wisconsin, Kansas.
 Western: California.

STATE-LOCAL SYSTEM.

North Atlantic: Maine, New Hampshire, Connecticut, Massachusetts.
 South Atlantic: (None.)
 South Central: Alabama.
 North Central: (None.)
 Western: New Mexico.

COUNTY SYSTEM.

South Atlantic: Delaware.

Respecting this classification, it is to be said that from a strictly legal point of view a number of the States placed under the State systems belong in other divisions. These States are given below, together with the legal objection to such classification.

New Jersey.—City and county superintendents may issue temporary permits, valid for 30 days.

North Dakota.—County superintendents may issue temporary permits, valid until next examination. A high-school diploma (training school) is a license to teach.

Minnesota.—County superintendent countersigns certificates issued by State superintendent and issues third-grade certificates, valid for one year and renewable once, but limited to a single district. The county superintendent also passes upon the professional qualifications and the moral character of applicants.

Nebraska.—County superintendent signs all county certificates and passes upon each candidate's ability to teach and govern, but State superintendent prepares all questions and grades all papers.

South Dakota.—County superintendent issues temporary certificates, valid until next examination. Two cities issue local certificates.

Wyoming.—County superintendent issues temporary permit, valid until next examination.

Oregon.—County superintendent may issue temporary permit, valid until next examination. Portland may issue its own certificates.

Washington.—County superintendent may issue special certificates of indefinite validity. Four cities may issue local certificates under limitations prescribed in State laws.

Utah.—Four cities may issue local certificates.

It does not seem that the issuance of a temporary permit by a county superintendent is sufficient ground to place a State under the State-county or State-county-local system; nor does the issuance of certificates in a small number of school districts give sufficient warrant for placing these North Central and Western States in the same class with the State-local systems of New England. Nebraska, Minnesota, and Washington are nearer the border line, but the State superintendent seems practically to control the situation in Nebraska, and the third-grade certificate of Minnesota differs from the temporary permits of the other States only in the matter of duration, while the number of certificates issued by county superintendents to teach special branches within any county in Washington must be very small, since the superintendent of any city has the authority to issue such certificates for his city. So the above classification seems to present most fairly the real facts in each case.

On the other hand, there are two States that might be considered as belonging to the State group, but which have been assigned to the State-local group. These States, together with the situation in each case, are as follows:

Alabama.—42 cities and towns may issue their own certificates without limitation by the State law.

New Mexico.—9 cities and towns may issue their own certificates without limitation by State law.

It is believed that in each case the number of cities and towns which may issue certificates as compared with the number which can not is sufficiently large to warrant their classification under this head. In no case in the first group does a State have nearly so many as 5 per cent of its cities and towns issuing its own certificates, while in both of these States the percentage is far above this amount.

Texas, which is included under the State-county-local group, could be classified under the State-local system were it not that the only certificate issued by the county board of examiners—second grade—is valid for so long a period, 4 or 6 years, and is without doubt issued to a large number of teachers.

Cities in the States included in the State-county group may in certain instances issue local certificates under special acts. It is possible also that in practice only a comparatively small number of

the cities in certain States included in the State-county-local group issue their own certificates, depending entirely upon the State and county to certificate their teachers. The proportion of 5 per cent which was used above as a basis of differentiation between the State and State-local group has been followed likewise here to separate the State-county from the State-county-local group. In each State included in the latter group far more than 5 per cent of the cities and towns have the authority to issue local certificates. It should be added also that the New England towns found in the State-local group include both rural and urban communities, while in the other States the word "town" means a large collection of houses and other buildings grouped closely together and does not include the open country. Thus rural New England has the right of certifying its own teachers, a privilege not enjoyed by country districts in any other portion of the country.

TABLE 2.—*Number of States in each geographical division included under each form of administrative system.*

Divisions.	State system.	State-county.	State-county-local.	State-local.	County.	Total.
North Atlantic.....	3	2	2	4		9
South Atlantic.....	2	5			1	8
South Central.....		6	1	1		8
North Central.....	5	3	4			12
Western.....	7	2	1	1		11
Total.....	17	16	8	6	1	48

Local certificates prevail to the greatest extent in New England, and as we go west the centralization of authority in the State officers increases. Four of the State-local systems are in New England; 5 of the 8 State-county-local systems and 11 of the 16 State-county systems are in the South Atlantic and South Central States; while 12 of the 16 State systems are west of the Mississippi, 7 being in the Western States.

The tendency in the development of the administration of teachers' certificates has been and is toward centralization of authority in State agencies. Within the last 6 years at least 18 States have passed legislation which produced this effect, and in two-thirds of these a new era was entered upon. Iowa, Louisiana, New Mexico, Utah, Virginia, Wyoming, Vermont, and, within the past year, New Jersey, Pennsylvania, Georgia, Texas, Nebraska, and Oregon stand out as conspicuous examples.

As to the effect of centralizing the authority to certificate teachers in State agencies, there seems to be a general agreement that much good has come from it. Higher standards in the examination of teachers have generally prevailed, and the profession has been

advanced through the wider validity of certificates. The present movement toward recognition of certificates issued by State agencies in other States will have the effect of strengthening the tendency toward centralization. On the other hand, there is not apparent just now such a development in the office of superintendent of rural schools as would indicate a probability that such officers will soon

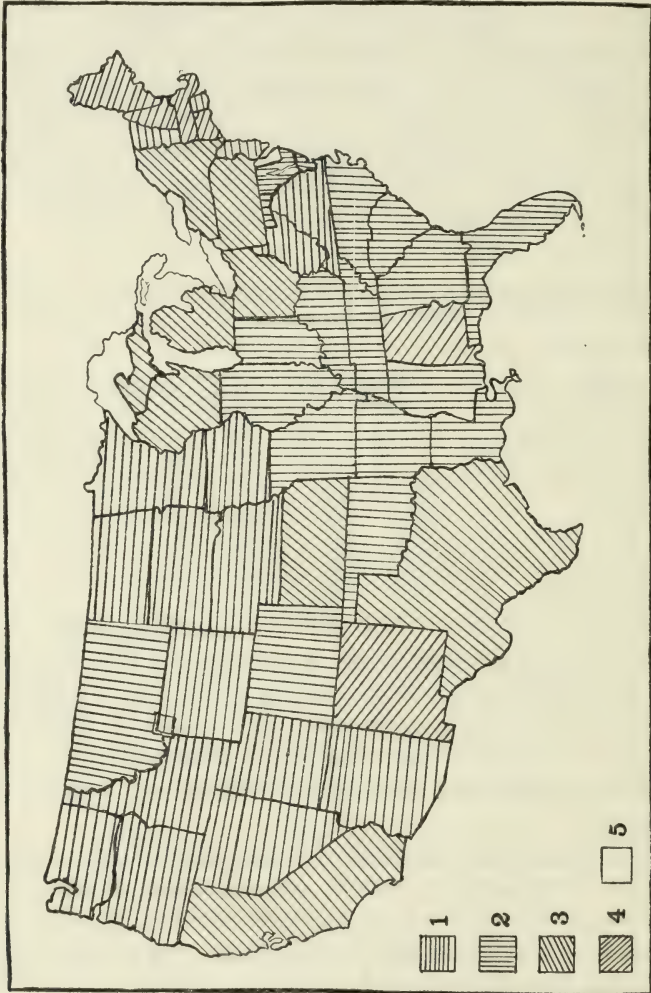


FIGURE 3.—Administrative organization for issuance of teachers' certificates. 1=State systems; 2=State-county systems; 3=State-county-local systems; 4=State-local systems; 5=county systems.

make a successful demand for the strengthening of the authority of the county agencies in granting certificates to their own teachers. The authority of cities in the certification of their teachers has been diminished during the past two years in two States. In fact, it has been removed altogether in both Nebraska and New Jersey. In the former State the State superintendent will issue city certificates; in

the latter they have been abolished altogether and the city teachers are required to hold the regular State certificates. On the other hand, in Michigan the number of cities that has the right to examine and certificate teachers has been increased. It seems that the larger cities will retain their authority in this respect because of the differences in the conditions which must be met by State offices, as now constituted, and city offices. Possibly with the development of the State education office there may be a diminution in the authority enjoyed by cities. At least the increase in the power of the State office in New Jersey was concomitant with increased power and dignity given to that office, while in Nebraska it seems that the former authority given cities was too liberal and needed correction.

PREPARATION OF QUESTIONS AND EXAMINATION OF PAPERS.

The preparation of questions and examination of papers are part of the administrative routine and are closely associated with the issuance of certificates. With the development of centralizing tendencies the authority either to make out the questions or to grade the papers has been taken from the county superintendents and similar officers and lodged in the higher authorities. It has been shown in the preceding section that of the 48 States all but 1 have teachers' certificates issued by State agencies. Of these 47 States, 34 have certificates issued by county agencies; but in 9 of them the functions of the county superintendent are either almost entirely controlled by the State superintendent—in Minnesota, Nebraska, and Idaho, or are confined to the issuance of permits or like certificates—in New Jersey, North Dakota, South Dakota, Wyoming, Oregon, and Washington. In the 25 States remaining in which the county superintendent has more power, 2 give to the central agencies the authority both to prepare the questions and to examine the papers, but in one of these States—New York—the State regents may waive their rule, and in another—Missouri—it applies only to the first-grade county certificate, except as other papers may be forwarded for grading by the State superintendent, who prepares all questions. In 16 other States the central office prepares the questions and the county officers grade the papers—South Carolina, Kentucky, Oklahoma, and Kansas (in these States the questions are prepared by the State board and the papers graded by the county board); Delaware and Indiana (questions by State board, grading by county superintendent); Florida, Mississippi, Louisiana, Texas, Ohio, Michigan, and Montana (questions by State superintendent, grading by county board); Georgia, Arkansas, and Colorado (questions by State superintendent, grading by county superintendent). In only 7 States are the county officers free from any interference by State education officers in the examination of teachers. These States are California (board of examiners),

Pennsylvania, Maryland, North Carolina, Tennessee, Illinois, and Wisconsin (county superintendents). In 2 of these States so many certificates are granted upon credentials issued by State authorities that the field of activity of the county boards is somewhat circumscribed—California and Tennessee. And in Wisconsin the standards of examination fixed by each county superintendent must have the approval of the State superintendent. Thus, in fact, there remain only 4 States in which all the county certificates are entirely under the control of county boards or superintendents, 3 among the South Atlantic and 1 among the North Central States.

State officers participate either directly or through county and local agencies in the certification of teachers outside of cities in all States but 8, viz, 4 New England States, Maine, New Hampshire, Massachusetts, and Connecticut; Pennsylvania, Maryland, North Carolina, and Illinois.

The following table presents these facts relating to certificates issued by county agencies in a form adapted to ready reference:

TABLE 3.—*Preparation of questions and examination of papers for certificates issued by county agencies.*

	Questions prepared by—				Papers examined by—			
	State board.	State super-intend.	County board.	County super-intend.	State board.	State super-intend.	County board.	County super-intend.
North Atlantic Division:								
New York.....		×				¹ ×		
Pennsylvania.....				×				×
South Atlantic Division:								
Delaware.....	×							×
Maryland.....				×				×
North Carolina.....				×				×
South Carolina.....	×						×	
Georgia.....		×						×
Florida.....		×					×	
South Central Division:								
Kentucky.....	×						×	
Tennessee.....				×				×
Mississippi.....		×					×	
Louisiana.....		×					×	
Texas.....		×					×	
Arkansas.....		×						×
Oklahoma.....	×						×	
North Central Division:								
Ohio.....		×					×	
Indiana.....	×							×
Illinois.....				×				×
Michigan.....		×					×	
Wisconsin.....				×				×
Missouri.....		×				¹ ×		
Kansas.....	×						×	
Western Division:								
Montana.....		×					×	
Colorado.....		×						×
California.....			×				×	
North Atlantic Division.....		1		1		1		1
South Atlantic Division.....	2	2		2			2	4
South Central Division.....	2	4		1			5	2
North Central Division.....	2	3		2		1	3	3
Western Division.....		2	1				2	1
United States.....	6	12	1	6		2	12	11

¹ See page 143.

PROVISIONS OF CERTIFICATES.

Every kind of certificate must contain three specifications which describe it and at the same time differentiate it from all other kinds of certificates. These are (1) the territory within which the holder may

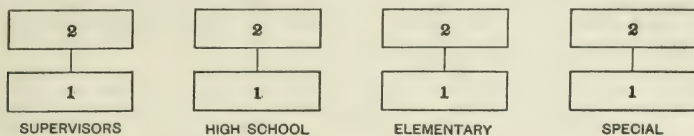


FIGURE 4.—The horizontal system in New Jersey. 1, limited certificate; 2, permanent certificate obtained after 3 years' successful experience under limited certificate. Each is valid in the school indicated beneath.

teach, (2) the kinds of positions he may fill, (3) the length of time the certificate is valid.

The difference in the relative importance which the various States place upon these three provisions have developed two distinct systems of certification. Those States which issue certificates for different kinds of schools and make this distinction between various certificates of greater importance than those relating to territory and duration have usually two or three certificates for each class of school. The corresponding certificates in each class are coordinate in rank, and all are valid throughout the entire State. On the other hand, those States which make the territorial basis superior to the other two provisions usually have from four to six or more certificates in an ascending series, most of which are valid in any kind of school or position. The lowest certificates in such States are valid only in a single county and the highest are valid throughout the entire State. The first type may be called the horizontal system; the second, the vertical. In most States a combination of these two systems exists at present. The latter was the first in point of time. Elements of the second have been introduced now and then; the primary and kindergarten certificates and special certificates are examples.

The figures on this page, representing graphically the certificate systems of New Jersey and of Kentucky, show the differences between the two systems and incidentally suggest the origin of the terms used to designate each. Temporary, university, and normal-school certificates and diplomas are omitted.

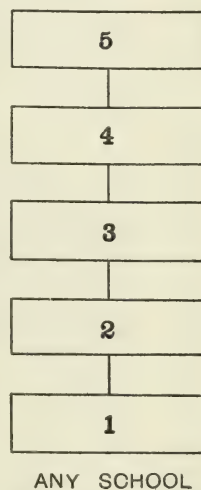


FIGURE 5.—The vertical system in Kentucky. 1, third-grade county; 2, second-grade county; 3, first-grade county; 4, State certificate; 5, State diploma. All are valid in any school.

The following tables (Tables 4 to 10) show the provisions of every certificate issued in each State. Before classifying the certificates according to (1) and (2), they were previously separated under the heads of the authorities issuing them in order that the relative number of certificates issued by each agency might be shown, and also the relation between the territory covered by the certificate and the jurisdiction of the officer granting it.

In these tables supervisor's certificates are included under "any school," while under "subjects named" appear all special certificates. The columns headed "No" contain the number of certificates, meeting the conditions, while opposite each number under "Duration" are given the terms for which each of the certificates is granted. Certificates valid in rural schools only are listed under elementary schools. L, signifies life; T, temporary; V, varies.

TABLE 4.—*Certificates issued by central agencies that are valid throughout the State, distribution among the respective classes of schools, and duration of such certificates.*

	Any school.		High school.		Elementary.		Primary and kindergarten.		Subjects named.	
	No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.
North Atlantic Division:										
Maine.....	10	L, 5, L, 5, 3, 1.....			4	L, 5, 3, 1.....				
New Hampshire.....	6	L.....			3	1, 1, 1.....			2	5, 2.
Vermont.....	11	L, 10, 5, 5, 3, 2, 1.....	2	L, 1.....			2	5, 5.....		
Massachusetts.....	1	1 to 5 years.....							1	2, 2, 2, 1.
Rhode Island.....	14	L, L, 5, 5, 3, 2, 2, 2, 1.....			3	3, 2, 4.....			3	3.
Connecticut.....	7	2.....			1	3.....	2	2, 1.....	1	3.
New York.....	9	L, L, L, 1, 5, 3.....	1	2.....	3	L, 1, 1.....	1	1.....	3	L, 1, 1.
New Jersey.....	13	L, L, L, 1, 1, 1.....			3	L, 1, 1.....			7	L, L, L, L, L, T, 3, 2.
Pennsylvania.....	7									
South Atlantic Division:										
Delaware.....	4	L, L, L, 5, 1.....								
Maryland.....	20	12, 10, 10, 9, 7, 7, 5, 5, 4, 2, 2, 1, 1, 1.....			2	7, 3.....			1	5.
Virginia.....							1	7.....		
West Virginia.....	11	4			6	5, 5, 3, 3, 1, 1.....	1	5.....		
North Carolina.....	3	2, 3, 3.....							1	3.
South Carolina.....	2	2, 2.....			1	L.....	2	L, 4.....		
Georgia.....	1									
Florida.....	5	2							1	5.
South Central Division:										
Kentucky.....	7	L, L, L, 8, 4, 3, 2.....								
Tennessee.....	8	L, 4, 1, 1.....	3	5, 3, 1.....	1	1.....				
Alabama.....	4	L, 6, 4, 2.....								
Mississippi.....	4	L, 1, 2.....								
Louisiana.....	2	2, 10, 4.....								
Texas.....	9	L, L, 4, 6, 6, 6.....			1	L.....	2	L, 4.....		
Arkansas.....	3	L, 6, 2.....								
Oklahoma.....	3	L, 10, 5, L, L, L, 5.....	3	L, 10, 5.....	4	L, 3, 2, 1.....	2	L, L.....	1	L.
North Central Division:										
Ohio.....	6	2								
Indiana.....	18	L, L, L, L, 8.....	2	L, 4.....			2	L, 4.....		
Illinois.....	45	1	4	5, 3, 2, 1 ²	4	3, 3, 2, 1 ³	5	L, 3, 2, 1, 1.....	1	1.
Michigan.....	10	L, L, 4.....	1	L.....					1	L.
Wisconsin.....	13	L, L, 5, 1, 2.....	5	L, L, 5, 1, 2.....	4	5, 3, 3, 3.....	1	L, 1.....	1	L.
					1	L.....	2	L, 1.....	5	L, L, L, 1, 1.

¹Varies; may be for life.

²To teach designated subjects only.

³Each certificate requires different amounts of professional training and experience.

⁴Includes one State supervisor's certificate (which is not tabulated) valid for life as principal or superintendent—any district.

TABLE 4.—*Certificates issued by central agencies that are valid throughout the State, distribution among the respective classes of schools, and duration of such certificates—Continued.*

	No.	Any school.		High school.		Elementary.		Primary and kindergarten.		Subjects named.	
		No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.
North Central Division—Continued.											
Minnesota.....	10	4	L, L, 2, 1.....			5	L, 5, 3, 2, 1.....			1	L.
Iowa.....	9	6	L, 5, 3, 2, 2, 1.....					1	5.....	2	5, 3.
Missouri.....	4	4	L, L, 5, 2.....							1	L.
North Dakota.....	10	7	L, 5, L, 5, 2, 2, T.....			2	3, 2.....				
South Dakota.....	4	2	L, 5.....			2	3, 2.....				
Nebraska.....	13	7	L, L, L, 3, 3, 3 ¹	1	(2).....	3	3 to 1, 3 to 1 ¹	2	(2).....	3	1, 1, 1.
Nebraska.....	9	4	L, L, 3, 2.....								
Western Division:											
Montana.....	5	5	L, 6, 5, 3, T.....			4	4, 2, 1, V.....	1	4.....	1	4.
Wyoming.....	9	3	L, L, T.....								
Colorado.....	2	7	L, 5, 5.....								
New Mexico.....	7	7	L, 5, 3, 3, 2, 1, T.....								
Arizona.....	6	2	L, 6.....			2	4, 3 ⁴			2	4, 4.
Utah.....	10	2	L, L.....	1	1.....	5	L, L, 5, 2, 2.....	1	2.....	1	5.
Nevada.....	9	5	L, L, L, 4, 5.....			3	5, 3, 2.....			1	2.
Idaho.....	3	2	L, 8.....			1	2.....	2	L, 5.....	1	8.
Washington.....	17	14	L, L, L, L, L, L, 5, 5, 5, 5, 3, 2, 1.....			3	L, 5, 1.....	1	5.....	1	L.
Oregon.....	11	3	L, 5, 1.....	3	L, 5, 1.....	1	L.....			1	L.
California.....	4	1	L.....								
North Atlantic Division.....											
South Atlantic Division.....	78	39		3		14		5		17	
South Atlantic Division.....	46	30		0		9		4		3	
South Atlantic Division.....	55	38		6		6		1		1	
South Atlantic Division.....	111 ³	50		8		22		13		15	
North Central Division.....	83	46		4		19		6		8	
Western Division.....	371 ⁵	201		21		70		32		44	
United States.....											

¹Varies; may be for life.²City certificates of five different grades shall be granted as State certificates under rules to be prescribed by the State superintendent.³Two are for teaching in institutes.⁴Not valid to teach in eighth grade.⁵One supervisor's certificate and two institute certificates are not included in the distribution.

TABLE 5.—*Certificates issued by county agencies that are valid throughout the county, distribution among the respective classes of schools, and duration of such certificates.*

	No.	Any school.		High school.		Elementary.		Primary and kindergarten.		Single subjects.	
		No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.
North Atlantic Division:											
New York.....	3					3	10, 10, 3.....			2	3, 1.
South Atlantic Division:											
Delaware.....	4	4	10, 5, 2, 1.....								
Maryland.....	4	4	5, 5, 5, 5.....								
North Carolina.....	3	3	3, 1, 1.....								
South Carolina.....	13	3	2, 2, 2.....			3	3, 2, 1.....			1	T.
Georgia.....	24										
Florida.....	35	4	L, 5, 4, 2.....			1	T.....				
South Central Division:											
Kentucky.....	3	3	4, 2, 1.....								
Tennessee.....	2	1	1.....			1	1.....				
Mississippi.....	5	5	1, 2, 3, 1, 1.....								
Louisiana.....	4	3	5, 3, 1.....							1	5.
Texas.....	1	1	6.....								
Arkansas.....	3	3	2, 1, T.....								
Oklahoma.....	3	3	3, 2, 1.....								
North Central Division:											
Ohio.....	615			5	5, 8, 1, 2, 6, 3.....	5	5, 8, 1, 2, 6, 3.....			5	5, 8, 1, 2, 6, 3.
Indiana.....	9			3	3, 2, 1, 7.....	3	3, 2, 1.....			3	3, 2, 1.....
Illinois.....	3	2	2, 1.....							1	1.....
Michigan.....	5	94	4, 3, 1, 1.....							3	4, 2, 1.....
Wisconsin.....	9					6	5, 3, 1, 1, 3, 1.....				
Missouri.....	4	4	3, 2, 1, T.....								
North Dakota.....	1	1	T.....								
Nebraska.....	4										
Kansas.....	24	24	3, 2, 1, T.....			4	3, 2, 1, 10 T.....				

1 Valid in any other county upon registration.

2 Valid in any other county when indorsed by county commissioner or by county superintendent.

3 A first-grade life certificate issued without examination is valid throughout the State, but for life only in the county in which issued.

4 Examination papers may be sent to another parish upon request of its superintendent.

5 Indorsement of first-grade certificate compulsory in every other county. Indorsement of second-grade certificate compulsory in adjoining counties. Third grade is valid in county only.

6 Professional certificates issued by county agencies are valid throughout the State.

7 To teach designated subjects only. Five-year license is valid for elementary schools also.

8 Not fixed by law.

9 Two of these are valid in rural schools only.

10 If holder is a college graduate, valid in any school.

TABLE 5.—*Certificates issued by county agencies that are valid throughout the county, distribution among the respective classes of schools, and duration of such certificates—Continued.*

	Any school.		High school.		Elementary.		Primary and kindergarten.		Single subjects.	
	No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.
Western Division:										
Montana.....	15	3.			4	3, 2, 1, ² T.				
Wyoming.....	1	T.								
Colorado.....	3	3, 2, 1.								
New Mexico.....	1	T.								
Idaho.....	3	5, 3, 1, ³ 1, T.							1	L.
Washington.....	4	2							2	L, 6.
Oregon.....	1	T.			3	L, 6, 2.				
California.....	10	3			3					
North Atlantic Division.....	5				3				2	
South Atlantic Division.....	23	18			4				1	
South Central Division.....	21	19			1				1	
North Central Division.....	54	15	8		18		7		6	
Western Division.....	4	28	15		7		2		3	
United States.....	131	65	5		33		9		13	

¹ Valid in any other county when indorsed by county commissioner or by county superintendent.² If holder is a college graduate, valid in any school.³ First and second grade certificates are valid in any county in State when properly filed.⁴ No information concerning schools in which temporary certificate is valid.

TABLE 6.—*Certificates issued by central agencies that are valid in a single county, distribution among the respective classes of schools, and duration of such certificates.*

	No.	Any school.		High school.		Elementary.		Primary and kindergarten.	
		No.	Duration.	No.	Duration.	No.	Duration.	No.	Duration.
North Atlantic Division: New Jersey...	2	2	T, T.						
South Atlantic Division: West Virginia.	1	1	T.						
South Central Division:									
Tennessee.....	1			1	2.				
Alabama.....	1	1	T.						
Mississippi.....	1	1	G.						
North Central Division:									
Minnesota.....	1 ²					1 ²	2, 1.		
Iowa.....	1	1	T.						
South Dakota.....	2	1 ¹	2.					1	1 ⁵ .
North Atlantic Division.....	2	2							
South Atlantic Division.....	1	1							
South Central Division.....	3	2		1					
North Central Division.....	5	2				2		1	
United States.....	11	7		1		2		1	

¹ Valid in any other county when indorsed by county commissioner.TABLE 7.—*Certificates issued by central agencies that are valid in a single town or district.*

	No.	Territory.	Schools.	Duration.
North Atlantic Division:				
Vermont.....	2	Town and school specified...	Any, and school specified...	1, T.
Rhode Island.....	1	Town.....	Any.....	1.
Connecticut.....	1	do.....	Branches named.....	1.
New York.....	1		Any.....	1.
South Atlantic Division:				
Virginia.....	1	Special school.....	Special school.....	T.
North Central Division:				
Wisconsin.....	3	District.....	Subject specified; high school principal, and school specified.	Varies, 1, T.
South Dakota.....	1	do.....	Elementary.....	1.
Nebraska.....	1	do.....	Common school districts.....	T.
Western Division:				
Utah.....	1	do.....	School specified.....	T.
Nevada.....	2	do.....	Any.....	T, T.
North Atlantic Division.....	5			
South Atlantic Division.....	1			
North Central Division.....	5			
Western Division.....	3			
United States.....	14			

TABLE 8.—*Certificates issued by county agencies that are valid in a single district, distribution among the respective classes of schools, and duration of such certificates.*

	No.	Territory.	School.	Duration.
North Atlantic Division:				
New York	2	Special school.....	Special school.....	2, 2.
South Central Division:				
Oklahoma	1	District.....		T.
North Central Division:				
Ohio	1	do.....		T.
Michigan	1	do.....		T.
Wisconsin	1	do.....		T.
Minnesota	1	do.....		1.
South Dakota	1	do.....	Elementary	T.
Western Division: Montana	1	do.....	Special branches.....	3.
North Atlantic Division	2			
South Central Division	1			
North Central Division	5			
Western Division	1			
United States	9			

TABLE 9.—*Certificates issued by local agencies.*

	No.	Territory.	Schools.	Duration.
North Atlantic Division:				
Maine	1	Town.....	Branches named.....	1.
New Hampshire	1	District.....	do.....	1.
Massachusetts	1	Town.....		1.
Connecticut	2	do.....	Branches named.....	Varies.
New York	1	do.....	Varies.....	Do.
South Atlantic Division:				
West Virginia	1	City.....	Kindergarten.....	Do.
South Central Division:				
Alabama	1	Separate districts.....	(1).....	(1)
Texas	6	City.....	Any.....	L or 4.
North Central Division:				
Ohio	7	(2).....	(2).....	(2)
Wisconsin	9	City or county.....	Elementary and branches named.....	3 or 1, 1.
North Dakota	1	State.....	Elementary.....	2.
South Dakota	2	City.....		Varies.
Kansas	3	City, district, county.....	High school.....	Do.
Western Division:				
Colorado	1	District.....	Any.....	Do.
New Mexico	1	City.....		Do.
Utah	3	do.....	High school, grammar or primary.....	Do.
Washington	5	do.....	High school, grammar, primary, special.....	L, 1, 1, 1, T.
Oregon	1	District.....		T.
California	2	City, or city and county.....	Elementary or special.....	6.
North Atlantic Division	6			
South Atlantic Division	1			
South Central Division	7			
North Central Division	22			
Western Division	13			
United States	49			

¹ No detailed provisions.² Same as county certificate—valid in other cities.

TABLE 10.—*Summary of certificates issued by central, county, and local agencies—
Tables 4-9.*

	Grand total.	Central agencies.				County agencies.			Local agencies.
		Total.	Valid in—			Total.	Valid in—		
			State.	County.	Town or district.		County.	District.	
North Atlantic Division:									
Maine.....	11	10	10						1
New Hampshire.....	7	6	6						1
Vermont.....	13	13	11		2				
Massachusetts.....	2	1	1						1
Rhode Island.....	15	15	14		1				
Connecticut.....	10	8	7		1				2
New York.....	16	10	9		1	5	3	2	1
New Jersey.....	15	15	13	2					
Pennsylvania.....	11	7	7			2	2		
South Atlantic Division:									
Delaware.....	4					4	4		
Maryland.....	8	4	4			4	4		
Virginia.....	21	21	20		1				
West Virginia.....	13	12	11	1					1
North Carolina.....	6	3	3			3	3		
South Carolina.....	5	2	2			3	3		
Georgia.....	5	1	1			4	4		
Florida.....	10	5	5			5	5		
South Central Division:									
Kentucky.....	10	7	7			3	3		
Tennessee.....	11	9	8	1		2	2		
Alabama.....	6	5	4	1					1
Mississippi.....	10	5	4	1		5	5		
Louisiana.....	6	2	2			4	4		
Texas.....	16	9	9			1	1		6
Arkansas.....	6	3	3			3	3		
Oklahoma.....	22	18	18			4	3	1	
North Central Division:									
Ohio.....	29	6	6			16	15	1	7
Indiana.....	27	18	18			9	9		
Illinois.....	8	5	5			3	3		
Michigan.....	16	10	10			6	5	1	
Wisconsin.....	36	17	13		3	10	9	1	9
Minnesota.....	13	12	10	2		1		1	
Iowa.....	10	10	9	1					
Missouri.....	8	4	4			4	4		
North Dakota.....	12	10	10			1	1		1
South Dakota.....	10	7	4	2		1		1	2
Nebraska.....	18	14	13		1	4	4		
Kansas.....	16	9	9			4	4		3
Western Division:									
Montana.....	11	5	5			6	5	1	
Wyoming.....	10	9	9			1	1		
Colorado.....	6	2	2			3	3		1
New Mexico.....	9	7	7			1	1		1
Arizona.....	6	6	6						
Utah.....	14	11	10		1				3
Nevada.....	11	11	9		2				
Idaho.....	8	3	3			5	5		
Washington.....	24	17	17			2	2		5
Oregon.....	13	11	11			1	1		1
California.....	16	4	4			10	10		2
North Atlantic Division.....	98	85	78	2	5	7	5	2	6
South Atlantic Division.....	72	48	46	1	1	23	23	0	1
South Central Division.....	87	58	55	3	0	22	21	1	7
North Central Division.....	203	122	111	5	5	59	54	5	22
Western Division.....	128	86	83	0	3	29	28	1	13
United States.....	588	399	373	11	14	140	131	9	49

TERRITORY COVERED BY CERTIFICATE.

Analyzing the statistics presented in the foregoing 7 tables from the standpoint of the territory within which the holder is authorized to teach, we find that of the 588 different kinds of certificates included in this study (see Table 10) 64 per cent are valid throughout the entire State in which they are issued, 24 per cent are valid in a single county, some of which may be indorsed in other counties (e. g., Oklahoma), or grades may be certified to other counties (e. g., Nebraska), and 12 per cent are valid only in the city, town, or school district specified.

The States are divided into 4 groups from this point of view, after eliminating the certificates issued in cities and the temporary permits, which are in most cases issued by local officers and have their validity limited to a single school or district.

These groups, together with the State composing each, are as follows:

1. States in which all certificates except those noted above are valid throughout the entire State:

North Atlantic Division: Vermont, Rhode Island, New Jersey.....	3
South Atlantic Division: Virginia, West Virginia.....	2
South Central Division: Alabama.....	1
North Central Division: Iowa, North Dakota, South Dakota.....	3
Western Division: Wyoming, New Mexico, Arizona, Utah, Nevada, Oregon.....	6
Total.....	15

2. States having certificates some of which are valid throughout the entire State and others valid only in a specified county (omitting those certificates noted above):

North Atlantic Division: New York, Pennsylvania.....	2
South Atlantic Division: Maryland, North Carolina, South Carolina, Georgia, Florida.....	5
South Central Division: Kentucky, Tennessee, Mississippi, Louisiana, Texas, Arkansas, Oklahoma.....	7
North Central Division: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Missouri, Nebraska, Kansas.....	9
Western Division: Montana, Colorado, Idaho, Washington, California.....	5
Total.....	28

3. States having certificates all of which are valid only in a specified county:

South Atlantic Division: Delaware.....	1
--	---

4. States having certificates some of which are valid throughout the entire State and others only in a specified town:

North Atlantic Division: Maine, New Hampshire, Connecticut, Massachusetts..	4
---	---

It is thus seen that in one-third of the States the validity of all certificates issued, except city and temporary, is State-wide, and that not quite three-fifths of the States still retain the dual territorial

system of State and county certificates, while one-twelfth have the dual State-town system. State-wide validity is most prevalent in the western States, State-town validity in the North Atlantic division, and State-county validity in the South Central, North Central, and

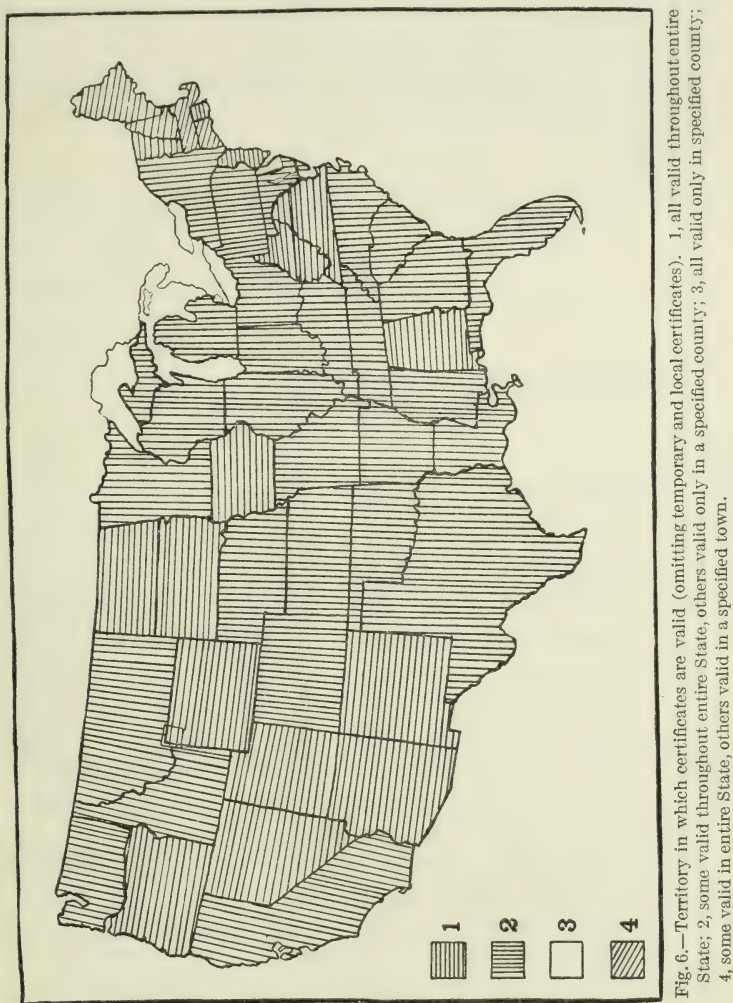


Fig. 6.—Territory in which certificates are valid (omitting temporary and local certificates). 1, all valid throughout entire State; 2, some valid throughout entire State, others valid only in a specified county; 3, all valid only in specified county; 4, some valid in entire State, others valid in a specified town.

South Atlantic divisions, the last named having seven-eighths, three-fourths, and five-eighths of the States in each division, respectively. Delaware is the only State in the Union having no certificates valid throughout the entire State.

VALIDITY OF CERTIFICATES—SCHOOLS OR POSITIONS.

A study of Tables 4 to 9, from the standpoint of the schools in which the different kinds of certificates authorize their holders to teach, reveals a number of interesting facts. As the data relating to city, town, and district certificates under this head are not available they are not included in this analysis.

A comparison of the proportion of certificates valid throughout the State and in a single county for each of the various types of schools (Tables 4 to 9) results as follows:

TABLE 11.—Percentage of certificates valid in each type of school. A. Valid in State.
B. Valid in county.

	Number of certificates.		Percentage.		
	State.	County.	State.	County.	Difference.
Total.....	354	129	100	100	.....
Any school.....	191	72	54	55.8	+1.8
High school.....	19	6	5.4	4.6	— .8
Elementary schools.....	69	31	19.5	24	+4.5
Primary and kindergarten.....	32	10	9	7.8	—1.2
Special.....	43	10	12.1	7.8	—4.3

The small proportion of primary and kindergarten and special certificates in the county list is due partially to the fact that many States have extended differentiation of certificates between various classes of schools only in those issued through the State office. Only 4 States—Indiana, Michigan, Wisconsin, and California—authorize the issuance of primary and kindergarten certificates, and only 7—Pennsylvania, Georgia, Louisiana, Ohio, Illinois, Washington, and California—grant special certificates, through county agencies. The larger proportion of elementary certificates in the counties is due in large measure to the desire of the States to build up their high schools by preventing those holding lower grades of certificates from teaching in them. Some of these elementary certificates are limited to the rural schools.

Every State issues one or more certificates valid in any school in the State.

The following States issue one or more certificates valid only in high schools:

North Atlantic: New Hampshire, New York.....	2
South Atlantic: (None).....	0
South Central: Tennessee, Oklahoma.....	2
North Central: Ohio, Indiana, Illinois, Nebraska.....	4
Western: Utah, Oregon.....	2
Total.....	10

The following States issue one or more certificates, valid only in the elementary or rural schools:

North Atlantic: Maine, New Hampshire, Connecticut, New York, New Jersey..	5
South Atlantic: Virginia, West Virginia, South Carolina, Georgia, Florida.....	5
South Central: Tennessee, Texas, Oklahoma.....	3
North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska.....	9
Western: Montana, Wyoming, Arizona, Utah, Nevada, Washington, Oregon, California.....	8
Total.....	30

The following States issue one or more certificates, valid only in the primary grades or in the kindergarten, or in both:

North Atlantic: Vermont, Connecticut, New York, New Jersey, Pennsylvania..	5
South Atlantic: Virginia, West Virginia, Florida.....	3
South Central: Texas, Oklahoma.....	2
North Central: Ohio, Indiana, Michigan, Wisconsin, Iowa, South Dakota.....	6
Western: Wyoming, Arizona, Utah, Washington, Oregon, California.....	6
Total.....	22

The following States issue one or more certificates authorizing the holder to teach only the branches specified (drawing, music, manual training, domestic science, foreign languages and other high-school subjects, and in similar States primary and kindergarten subjects):

North Atlantic: Vermont, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania.....	6
South Atlantic: Virginia, North Carolina, Florida.....	3
South Central: Oklahoma.....	1
North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, North Dakota, Kansas.....	9
Western: Wyoming, Arizona, Utah, Nevada, Idaho, Oregon, California, Washington.....	8
Total.....	27

The States which have one or more certificates for every kind of school, and also one or more certificates valid in any school, are 6 in number—New York, Oklahoma, Ohio (elementary and special issued in county and valid in county), Indiana, Utah, and Oregon. All the Pennsylvania certificates are granted for “branches named.” Three others have every kind in fact—New Jersey, Nevada, and California, but in the first two the high-school certificate is valid in any school and in the latter the kindergarten certificate is included in the special certificate. Nebraska, under the revised system, may also be added. (See appendix, p. 258.) Illinois has every kind but the primary and kindergarten.

The following 7 States have every kind but the high-school certificate—Connecticut, Virginia, Florida, Michigan, Wisconsin, Wyoming,

and Washington (special certificate is a county certificate). North Dakota should also be included, for its primary and kindergarten certificates are issued as special certificates.

Five States have only elementary school certificates in addition to the certificate valid in any school—Maine, New Hampshire, South Carolina, Georgia, and Tennessee.

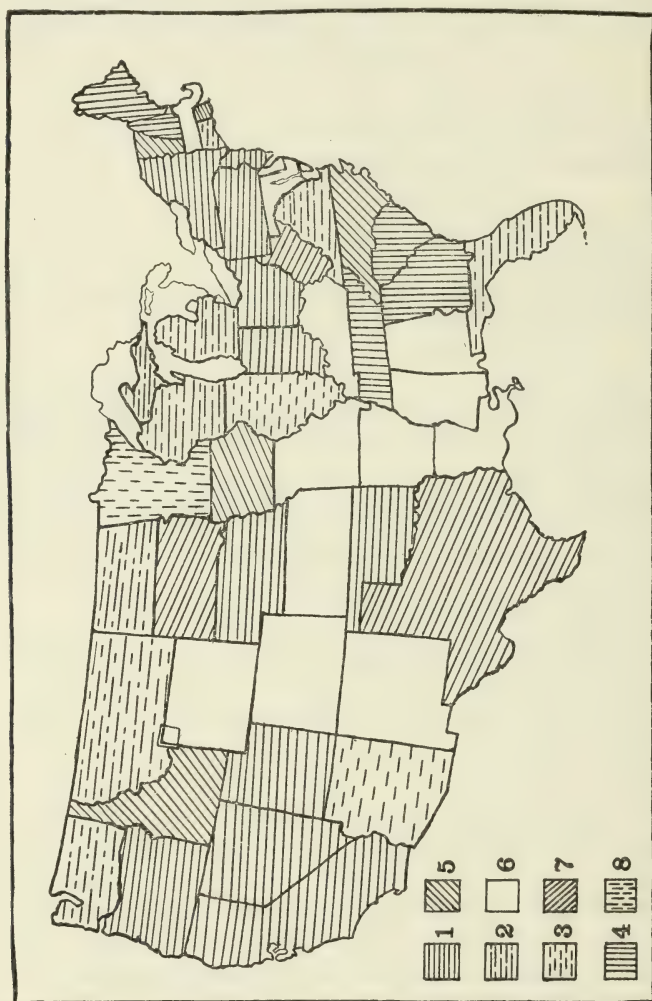


FIGURE 7.—Certificates for different types of schools in addition to certificates valid in any school. 1. States having every kind. 2. States having every kind but high school. 3. States having every kind but primary or kindergarten. 4. States having elementary schools only. 5. States having primary or kindergarten only. 6. States having none. 7. States having elementary and primary or kindergarten. 8. States having elementary and special.

Five other States have the primary or kindergarten certificate, or both, in addition to the certificate valid in any school—Vermont, Rhode Island, North Carolina, Iowa, Idaho.

Three States have the primary or kindergarten certificate, or both, and the elementary certificate in addition to the certificate valid in any school—West Virginia, Texas, and South Dakota.

One State has the special and elementary certificate in addition to the certificate valid in any school—Minnesota.

Thirteen States issue no certificates other than those valid in any school—Massachusetts, Delaware, Maryland, Kentucky, Alabama, Mississippi, Louisiana, Arkansas, Missouri, Kansas, Montana, Colorado, New Mexico.

DURATION OF CERTIFICATES.

The length of time for which certificates of different kinds are granted does not vary to any great extent between the different classes of schools in which they are valid. The only noticeable exception to a fairly even distribution of varying terms is in the relatively large number of life certificates valid in any school. This is due to the natural tendency to make the highest certificates issued in any State valid in all schools and to the opportunities provided for obtaining life certificates upon the basis of several different sets of conditions, as graduation from college or normal school, and long service, thereby making a relatively large number of permanent certificates.

The following table shows the relation between duration of certificates and the territory in which the certificates are valid. The first division shows the duration of certificates issued by central agencies that have State-wide validity; the second shows those issued by county agencies that have county validity. Temporary certificates are excluded, as well as those whose terms are variable, thus accounting for the differences in the totals from those in Tables 4 and 5 from which the reckoning was made. As there are but 11 certificates issued by State agencies where validity is limited to a county and as there are but 23 certificates issued by State and county where validity is limited to a town or district, most of which are temporary, the figures given in the table may be taken as representing the essential facts in regard to duration of all certificates issued in the several States other than those issued by local agencies.

TABLE 12.—*Duration of certificates: A, issued by central agencies and valid throughout the State; B, issued by county agencies and valid in county only.*

States.	Life.	Duration, in years.												Total.
		12	11	10	9	8	7	6	5	4	3	2	1	
A.														
North Atlantic Division.....	22			1					13	1	10	13	17	77
South Atlantic Division.....	6	2		2	1		5	2	11	2	5	5	5	46
South Central Division.....	21			3		1		5	4	7	3	5	6	55
North Central Division.....	40					1			12	4	18	14	20	109
Western Division.....	28					2		2	18	7	5	9	7	78
Total.....	117	2		6	1	4	5	9	58	21	41	46	55	365
B.														
North Atlantic Division.....				2							2		1	5
South Atlantic Division.....	1			1					7	1	2	6	4	22
South Central Division.....								1	2	1	3	4	9	20
North Central Division.....						1			4	2	12	11	17	47
Western Division.....	5							4	1		4	3	4	21
Total.....	6			3		1		5	14	4	23	24	35	115
Grand total.....	123	2		9	1	5	5	14	72	25	64	70	90	480

Generally speaking State certificates are issued for longer terms than county certificates. Of the former the most frequent duration, as they are distributed in the above table, is life; then 5 years, 1 year, 2 years, 3 years, 4 years, and 6 years; while of the latter the most frequent duration is 1 year; then 2 years, 3 years, 5 years, life, 6 years, and 4 years. Four-ninths of the former are for 4 years or under, while one-half of the latter are for 2 years or under. Five-ninths of the former are for 5 years or over, while but one-fourth of the latter are for the same period. This marked difference is due, to be sure, to the large number of life certificates, but eliminating them entirely from consideration the same difference exists, although not in so large measure.

Analyzing the grand totals for each period in the table, we find that certificates, from the standpoint of duration, can be divided into three classes—two large classes at opposite ends of the range of distribution and a small one between—first, the life certificate, which comprises almost exactly one-fourth the total number; second, those whose duration is 5 years or less, amounting to a little over two-thirds (67.6 per cent) of the entire number issued; and, third, those whose duration is from 6 to 12 years, containing about one-fourteenth of the total number.

Of the 36 certificates issued for periods varying from 6 to 12 years, inclusive, 13 are in the South Atlantic, 10 in the South Central, 8 in the Western, 3 in the North Atlantic, and 2 in the North Central Division; 1 twelve-year certificate is issued, each, in Virginia and West Virginia; 2 ten-year certificates each in New York, Virginia, and Oklahoma, and 1 each in Vermont, Louisiana, and Delaware; 1 nine-year certificate is issued in Virginia; 2 eight-year certificates are

issued in Idaho, and 1 each in Kentucky, Ohio, and Indiana; 5 seven-year certificates are issued in Virginia; 4 six-year certificates are issued each in California and Texas, 2 in West Virginia, and 1 each in Alabama, Arkansas, Montana, and Arizona. Virginia issues the greatest number of certificates of this long duration, having 9 such certificates; California and Texas have 4 each, and Wyoming and West Virginia 3 each, the remaining 13 States having but 1 or 2 each.

Arranged by geographical divisions the States issuing certificates ranging in duration from 6 to 12 years, are as follows:

North Atlantic: Vermont, New York.....	2
South Atlantic: Delaware, Virginia, West Virginia.....	3
South Central: Kentucky, Alabama, Louisiana, Texas, Arkansas, Oklahoma.....	6
North Central: Ohio, Indiana.....	2
Western: Montana, Wyoming, Arizona, Idaho, California.....	5
Total.....	18

The relatively small number of four-year certificates is worthy of note. Of the 25 issued, 18 are in the Southern and Western States; Wyoming, Arizona, and Ohio have 3 each; Texas, Kentucky, Florida, and Michigan, 2 each; Rhode Island, Virginia, Tennessee, Alabama, Louisiana, Arkansas, Wisconsin, and Nevada, 1 each.

The States the term of whose certificates are confined to the most prevalent periods—life, 5, 3, 2, and 1 years—are as follows:

North Atlantic: Maine, New Hampshire, Massachusetts, Connecticut, New Jersey, Pennsylvania.....	6
South Atlantic: Maryland, North Carolina, South Carolina, Georgia.....	4
South Central: Mississippi.....	1
North Central: Illinois, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.....	8
Western: Colorado, New Mexico, Utah, Washington, Oregon.....	5
Total.....	24

The following States could be included in the above list if the 4-year certificates were added to the others:

North Atlantic: Rhode Island.....	1
South Atlantic: Florida.....	1
South Central: Kentucky, Tennessee.....	2
North Central: Michigan, Wisconsin.....	2
Western: Nevada.....	1
Total.....	7

Practically all of the life certificates are issued by central authority (State board, State office, or State educational institutions) and are valid throughout the State. Of the 6 issued by county agencies 5 are in California and 1 in Florida, and in the case of the former State many of the individual certificates are based upon credentials

approved by the State board or upon graduation from institutions approved by said board.

Judging by the relative frequency of the different periods for which certificates are issued in the various groups of States the 5-year certificate is in greater favor than any other in the Western and also in the South Atlantic division; the 4-year in the South Central and

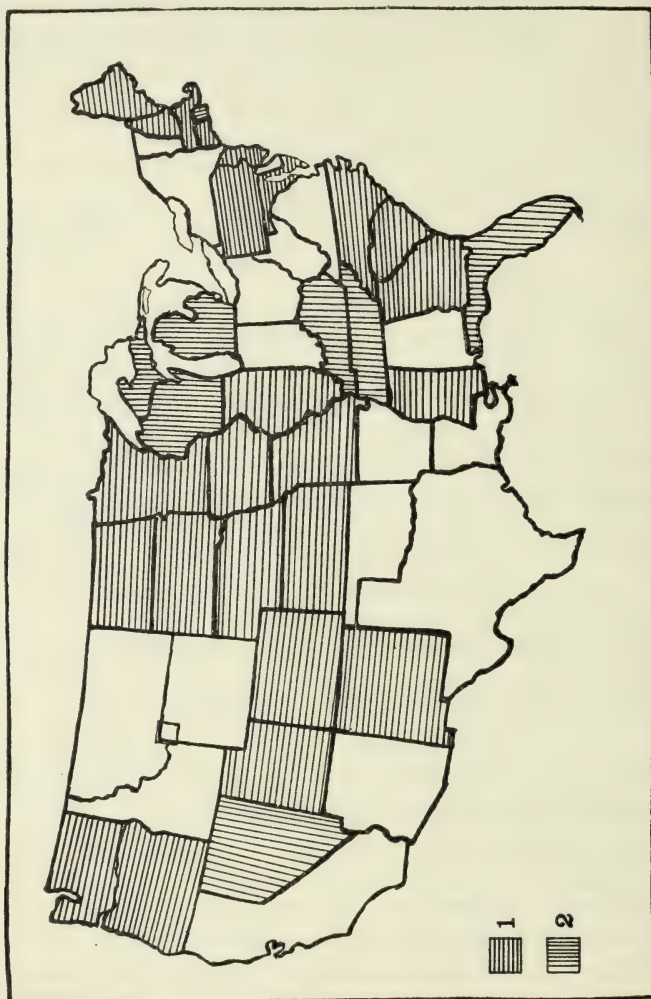


FIGURE 8.—Periods for which certificates are issued.

1. States whose certificates are for life, 5, 3, 2, or 1 years. 2. States whose certificates are for life, 5, 4, 3, 2, or 1 years.

the 1-year in the North Central and North Atlantic divisions. The 3-year and 2-year certificates exist in greatest numbers in the North Central States, although there are not so many of them as of the 1-year certificate.

The following 8 States do not issue life certificates: Delaware, Virginia, West Virginia, North Carolina, South Carolina, Massachusetts,

Louisiana, and Colorado. All but two, however—Delaware and North Carolina—make provision for renewal of their highest certificates. In Colorado the second renewal must be for life, while in the remaining States the certificates are renewed for the original period, from time to time, provided the conditions for renewal have been met.

SCHOLARSHIP AND EXPERIENCE REQUIREMENTS.

While, as was said above, any kind of certificate is described and differentiated from all other kinds by the territory in which it is valid, the schools in which its holder may teach, and the term of years it covers, it is just as true that its intrinsic merit is determined by a wholly different set of conditions. What a certificate is really worth is fixed by the scholarship, the experience, and the attainments to which it bears witness.

This study of scholarship requirements has one large and important limitation. All examinations in the same subject, all courses of the same length or of the same number of subjects, are presumed to be equal in content and in value. Every requirement made in the laws and regulations, and in the cases of requirements of graduation from State colleges, universities, and normal schools of the respective States, every statement made in the catalogue or register of such institutions is accepted at its face value. A further study of the examination questions, of the method and results of the grading of the papers, and of the quality of the work done in the various educational institutions concerned is much to be desired.

Four different kinds of scholarship requirements are stipulated, as follows: (1) Completion of hours, studies, or courses in educational institutions—high schools, training schools, summer schools, county institutes, State normal schools, and colleges and universities. (2) Examinations in certain school or college studies or subjects. (3) Possession of a prior certificate. (4) Professional reading and similar means for promoting or maintaining professional efficiency.

Varying degrees of each of these classes of requirements are adjusted to the capacities of persons that seek to enter or to continue in the work of teaching. In consequence, they can be best studied by segregating the requirements that are intended to apply to each of certain large classes of persons: (1) College graduates, (2) normal-school graduates and those completing certain courses in normal schools, (3) high-school graduates, (4) nongraduates with long experience, (5) nongraduates with little or no experience, (6) those who desire to do supervisory work, (7) those who desire to teach in primary schools and kindergartens, (8) those who desire to teach special subjects.

In order to facilitate comparison the certificates held by each of such classes of persons have been arranged in tables. The certificates of each State are grouped together, the order of the States being determined by their geographical position. All of the facts relating to scholarship requirements are given as well as such other facts as would assist in determining the comparative value of the different certificates. Sufficient indication of the provisions of each certificate to make possible an easy identification of it in the basal table (Table 1) is also furnished.

Scholarship requirements are stated in such ways as permit their measurement whenever possible. Time of study in educational institutions is indicated in years; 4 years is considered the standard time required for graduation from a standard college and also for graduation from a standard high school; and either 2 or 4 years for graduation from a normal school. The amount of professional work in a college course is given in semester hours in all possible cases.

Examination requirements are stated in the form of numbers of subjects in which examination is required. But to ascertain more accurately the practice of the different States in this regard, the examination subjects are divided into four classes:

(I) *Traditional elementary school subjects*.—(1) Reading; (2) writing; (3) orthography, punctuation, orthoepy; (4) language, composition; (5) grammar; (6) arithmetic, mental and written, number work; (7) geography; (8) United States history, elementary civics, local history; (9) physiology, hygiene, nature and effects of alcohol, stimulants, and narcotics.

(II) *Newer elementary school subjects*.—(1) Drawing; (2) music; (3) nature study; (4) agriculture; (5) manual training; (6) household arts, domestic science, etc.; (7) physical training; (8) current events.

(III) *Higher subjects (secondary and higher schools)*.—Rhetoric, literature, algebra, geometry, languages, history, physics, chemistry, biology, economics, and such other branches as compose the standard high school and college curricula, and also cataloging and use of school libraries.

(IV) *Professional subjects*.—Philosophy of education, history of education, psychology, school administration, theory and practice, methods, school law and State manuals, and such other professional subjects as may be named.

CERTIFICATES BASED PRIMARILY ON GRADUATION FROM COLLEGE.

In the following table, dealing with certificates based on college graduation, those which require a professional course are set over against those which do not. Within each State the certificate with the highest requirements is given first. The persistence of certificates is

included in this table also, in order that the relation of the certificates which usually form a progressive series, may be seen; the discussion of persistence is reserved, however, for a later section. The subjects in which examinations are required are divided into three classes only, the new elementary and higher subjects as given above being combined into one class and designated "higher." Only graduates of standard colleges (4-year course based on a 4-year high-school course) are dealt with in this table.

TABLE 13.—*Certificates based upon graduation from standard colleges, including state-*

States.	Professional course.								
	Amount of professional work.	Certificates valid in—		Subjects examined in—			Years experience required.	Years valid.	Term and conditions of renewal or of granting higher certificates.
		Territory.	Schools.	Elementary.	Higher.	Professional.			
North Atlantic Division:									
Maine.....									
New Hampshire.....									
Vermont.....									
Massachusetts.....									
Rhode Island.....	{ "Satisfactory." }	State..	Any.....				0.....	3.....	{ 6 years first and second time; third renewal may be permanent.
Connecticut.....	1 year.....	do..	{ Supervisor. }				15.....	Life..	
New York.....	{ Not specified. }	State..	Any.....					Life..	
	do.....	do..	do.....				0.....	3.....	{ Permanent certificate, 3 years' experience.
New Jersey.....							3.....		
Pennsylvania.....	{ 200 hours. }	State..	Any.....				3.....	Life..	
	do.....	do..	do.....				0.....	3.....	{ Permanent certificate, 3 years' experience.
South Atlantic Division:									
Maryland.....	2 years.....	do..	do.....				(3).....	(3).....	(3).....
Virginia.....									
West Virginia.....	6 courses..	State..	Any.....				0.....	5.....	{ Obtains 6-year certificate after 3 years' experience; then 12-year, after 4 additional years' experience, 12-year certificate renewable for like period if holder teaches 8 years under it.
North Carolina.....									
South Carolina.....									
Georgia.....									
Florida.....									
South Central Division:									
Kentucky.....	Not specified.	State..	Any.....				0.....	Life..	
Tennessee.....	2 courses, 3 months each.	do..	Secondary.				0.....	1.....	Annually for continuous service.
Alabama.....									
Mississippi.....									
Louisiana.....									
Texas.....	4 full courses.	State..	Any.....				0.....	Life..	
Arkansas.....									
Oklahoma.....	2 years.....	State..	Any.....				0.....	Life..	

¹ As superintendent.² Examination in subjects to be taught.

ment of additional requirements, and terms and conditions of renewals of such certificates.

No professional course.							
Certificates valid in—		Subjects examined in—			Years experience required.	Years valid.	Term and conditions of renewal or of granting higher certificates.
Territory.	School.	Elementary.	Higher.	Professional.			
{ State.....	Supervisor.....	0	0	6	2.....	Life.....	Original term; 40 weeks' experience.
do.....	Secondary.....	0	0	5	0.....	do.....	
do.....	Any.....				1½.....	5.....	
{ State.....	do.....				5.....	3.....	{ 6 years, first and second time; third renewal may be permanent.
do.....	Supervisor.....				10.....	Life.....	
do.....	do.....				Indefinite.....	do.....	
do.....	Secondary, any				3.....	do.....	
{ State.....	{ Secondary.....	1	(2)	4	3.....	Life.....	{ Permanent certificate, 3 years' experience.
do.....	{ Supervisor.....	1	(2)	5	8 as supervisor.		
do.....	do.....	1	(2)	4	0.....		
{ State.....	Any.....				Not specified ..	12.....	{ Similar period, from time to time; Do.
do.....	do.....				do.....	10.....	
do.....	Subject named				None.....	5.....	
{ do.....	Any.....				7.....	12.....	{ Similar period; 8 years' experience under original 12-year certificate issued; 4 additional years' experience.
do.....	do.....				3.....	6.....	
do.....	do.....	0	1	2	0.....	3.....	
do.....	do.....				0.....	2.....	Reissued upon reexamination. Not specified.
State.....	Any.....				3.....	Life.....	
{ State.....	Any.....				Exceptional success.	Life.....	
do.....	do.....				1½.....	do.....	

³ Varies; at discretion of State board.

TABLE 13—*Certificates based upon graduation from standard colleges,*

States.	Amount of professional work.	Professional course.						Years. experience required.	Years valid.	Term and conditions of renewal or of granting higher certificates.
		Certificates valid in—		Subjects examined in—						
		Territory.	Schools.	Elementary.	Higher.	Professional.				
North Central Division:										
Ohio.....	{ Not specified.	State..	Any.....	1	8	4	2½	Life...		
	{ do.....	do.....	do.....	1	8	1	0	4.....		Life certificate, 2½ years' experience.
Indiana.....										
Illinois.....										
Michigan.....	{ 11 semester hours. ²	State..	Any.....				0	Life...		
	{ 1 year.....	do.....	do.....				0	4.....		Life certificate after 3 years' experience.
Wisconsin.....	{ 12 semester hours.	do.....	do.....				1	Life...		
	{ do.....	do.....	do.....				0	1.....		Life certificate after 1 year's experience.
Minnesota.....	15 semester hours.	do.....	do.....				2 or 0	Life or 2.		Life certificate after 2 years' experience.
Iowa.....	(4)	do.....	do.....				0	5.....		Life; 3 years' experience.
Missouri.....										
North Dakota....	{ 20 semester hours.	State..	Any.....				1	Life...		
	{ 16 semester hours.	do.....	do.....				0	2.....		5 years; 6 months' experience. For life, 5 years' experience.
South Dakota....	{ 15 semester hours.	do.....	do.....				4½	Life...		
	{ do.....	do.....	do.....				2	5.....		Life certificate issued after 4½ years' experience.
	{ do.....	do.....	do.....				0	2.....		5 years' certificate issued after 2 years' experience.
Nebraska.....	{ 15 semester hours in education, 6 in psychology.	do.....	do.....				3	Life...		
	{ do.....	do.....	do.....				0	3 years.		
Kansas.....	{ 15 semester hours.	do.....	do.....				2	Life...		
	{ do.....	do.....	do.....				0	3.....		Life; 2 years' experience.

¹ A thesis is required also.² 11 semester hours in University of Michigan.

TABLE 13.—*Certificates based upon graduation from standard colleges,*

States.	Professional course.									
	Amount of professional work.	Certificates valid in—		Subjects examined in—			Years experience required.	Years valid.	Term and conditions of renewal or of granting higher certificates.	
		Territory.	Schools.	Elementary.	Higher.	Professional.				
Western Division:										
Montana.....	{ do.....	do.....	do.....				3	Life.....		
	{ do.....	do.....	do.....				0	5.....		Life; 3 years' experience.
Wyoming.....	30 semester hours.	do.....	Super-visor or any.				0	Life.....		
Colorado.....	20 semester hours.	do.....	do.....				2½	5.....		5 years, then for life, discretion of State board.
Arizona.....	1 year.....	do.....	do.....				0	4.....		
Utah.....	16 semester hours.	do.....	do.....				0	Life.....		
Nevada.....	{ 18 semester hours.	do.....	do.....				5	do.....		Life diploma; 5 years' experience.
	{ do.....	do.....	do.....				0	5.....		
Idaho.....	{ 16 semester hours.	do.....	do.....	(1)	(1)	(1)	5	Life.....		
	{ do.....	do.....	do.....				0	8 years.		Life certificate 5 years' experience.
Washington.....	{ 12 semester hours.	do.....	do.....				2	Life.....		
	{ do.....	do.....	do.....				0	5 years.		Life certificate; 2 years' experience.
	{ 15 semester hours.	do.....	Super-visor; secondary.				3½	Life.....		
Oregon.....	{ do.....	do.....	Second-ary.				¾	5.....		Life certificate; 3½ years' experience.
	{ do.....	do.....	do.....				0	1.....		5-year certificate; ½-year experience.
	{ 1 year of graduate work.	do.....	Any or ele-mentary.				2½	Life.....		
California.....	{ do.....	County	Any.....				0	6.....		Life; 2½ years' experience.
	{ do.....	do.....	Elementary.				0	6.....		do.....

¹ Examination as required by State board of education.

The States readily fall into four groups.

Group I. Nine States do not have college graduation as a qualification for a certificate, seven of which are in the two groups of Southern States and two in New England. They are Maine, Massachusetts, Delaware, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas.¹

¹Group II. The North Atlantic States are the most prominent for having no provision for professional studies in any of their certificates issued to college graduates, although there are three States making no such provision in both the South Atlantic and North Central divisions. The 10 States included in this group are:

North Atlantic: New Hampshire, Vermont, Connecticut, New Jersey.

South Atlantic: Virginia, North Carolina, South Carolina.

North Central: Indiana, Illinois, Missouri.

Group III. Ten other States, in which every division but the North Central is represented, issue both certificates which require professional study and those which do not. The Western States are the most prominent in this group, which is composed of the following States:

North Atlantic: Rhode Island, New York, Pennsylvania.

South Atlantic: West Virginia.

South Central: Texas, Oklahoma.

Western: Montana, Wyoming, Idaho, Washington.

Group IV. The remaining 19 States, the largest of the five groups, require that certain amounts of professional study be pursued either during the college course or in postgraduate study. All but three of these States lie in the North Central and Western divisions.

South Atlantic: Maryland.

South Central: Kentucky, Tennessee.

North Central: Ohio, Michigan, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Kansas.

Western: Colorado, New Mexico, Arizona, Utah, Nevada, Oregon, California.

The amount of professional study required, as well as the method of stating the requirements, varies greatly. The following amounts were gathered either from the laws or regulations, in which case they may be found also in Table 1, or from the requirements for graduation printed in the catalogues or registers of the State universities in the respective States.

¹ Probably in some of the States the diplomas of certain educational institutions are valid as certificates to teach, but no detailed provisions regarding such have been found in the school laws.

TABLE 14.—*Amounts of professional study required for certificates based primarily upon college graduation in certain States.*

Amount.	States.	Number of States.
2 courses, 3 months each.....	Tennessee.....	1
4 full courses.....	Texas.....	1
6 courses.....	West Virginia.....	1
4 credits.....	New Mexico.....	1
200 hours (11½ semester hours).....	Pennsylvania.....	1
11 semester hours.....	Michigan.....	1
12 semester hours.....	Wisconsin, Washington.....	2
14 semester hours in education.....	} Iowa.....	1
6 semester hours in psychology.....		
15 semester hours.....	South Dakota, Kansas, Montana, Oregon, Minnesota.....	5
15 semester hours in education.....	} Nebraska.....	1
6 semester hours in psychology.....		
16 semester hours.....	North Dakota, Utah, Idaho.....	3
18 semester hours.....	Nevada.....	1
20 semester hours.....	Colorado.....	1
30 semester hours.....	Wyoming.....	1
2 years.....	Maryland, Oklahoma.....	2
1 year.....	Arizona.....	1
1 year's post graduate.....	Rhode Island, California.....	3
Not specified.....	New Jersey, Kentucky, Ohio.....	3

It is interesting to note the large number of strong educational States in the North Central and Western divisions that have severally fixed upon amounts of work which vary but little, the most frequent being 15 semester hours.

But very few States require either an examination or practical experience in addition to graduation and completion of professional work; Ohio and Idaho require the former; Colorado and Maryland the latter, but the requirements may be waived by the State boards in Idaho and Maryland.

Certificates granted to college graduates who have not had professional study (Groups II and III above) require usually an examination or some experience, or both. But 1 State (South Carolina) requires neither. Two require examinations alone (Pennsylvania and North Carolina); 10 require experience alone. The States and the years of experience are as follows: Vermont, 1½; Rhode Island, 5, 10; New York, 3; West Virginia, 7-10; Texas, 3; Oklahoma, 1½; Montana, 5, 2; Washington, 2; Connecticut and Virginia not definitely stated. Eight require both examination and experience: New Hampshire, 2, 0; New Jersey, 3, 0; Indiana, 3½, 5½; Illinois, 1; Missouri, 4½, 1½; Wyoming, 2; Idaho, 5. The examinations are for the most part on professional subjects in all the States except Indiana.

Summarizing in part, it may be said that a minimum amount of professional study is required by 34 States for admission to one or more of the certificates based upon college graduation. Every State in the North Central division (12 States) and in the Western division (11 States) is represented in this number. Five are in the North Atlantic—New Hampshire, Rhode Island, New York, New Jersey,

Pennsylvania; two in the South Atlantic—Maryland and West Virginia; and four are in the South Central division—Kentucky, Tennessee, Texas, and Oklahoma.

CERTIFICATES BASED PRIMARILY ON COMPLETION OF COURSES IN NORMAL SCHOOLS.

The following table dealing with scholarship and experience requirements of certificates issued to normal-school graduates or those who have completed certain courses is similar to the previous table for graduates of colleges. It is necessary in the case of normal schools to define as accurately as possible the length of the course, as well as the length of the high-school course upon which it is based. This is done by giving the number of years in each. However, the figures can not be depended upon with full assurance. When the laws and regulations of the State do not specify the amounts, they are taken from the circulars of the State normal schools; but it was very difficult in a large number of cases, and impossible in others, to obtain an explicit statement upon these points. Then, too, if current reports are to be trusted, not all institutions observe with reasonable faithfulness the requirements for admission and graduation as published. Nevertheless, the table may be accepted as a sufficiently accurate presentation of the requirements as stated to serve as a tentative statement.

To have given a statement of all the alternatives relating to years of high-school work required for entrance to the various courses and the length of time to complete the courses based on such entrance requirements would have produced a mass of practically useless material and, more important, would have caused confusion in the mind of the reader and obscured the real situation. It seemed better, therefore, to reduce most of the statements regarding the length of high-school and normal courses to the basis of the length of term required to complete the course by a graduate of a 4-year high school or a person possessing a substantial equivalent. The fundamental distinction between courses continuing more than 2 years above a high school is made for the reason that the 2-year course seems to be generally accepted at the present time as of the proper length for a teacher of elementary schools. Because of wide differences in the courses of normal schools and the variety of the examinations required it did not seem worth while to attempt to tabulate and compare them. However, the States requiring examination in addition to completion of courses are indicated by notes.

TABLE 15.—*Certificates to which graduates and students of various courses in State normal*

States.	Based on 4-year high-school course and 2-year normal-school course or less.						
	Years in—		Certificates valid in—		Years experience required.	Years valid.	Terms and conditions of renewal or of granting higher certificates.
	Normal school.	High school.	Territory.	Schools.			
Maine.....	2	4	State....	Any.....	0	2	1 renewal without reexamination.
New Hampshire.....							
Vermont.....	$\left\{ \begin{array}{l} 2 \\ 2 \\ 4 \end{array} \right.$	$\left\{ \begin{array}{l} 4 \\ 4 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} \text{State}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{Any}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} 6 \\ 0 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Life}... \\ 10 \\ 5 \end{array} \right.$	$\left\{ \begin{array}{l} 10 \text{ years, then permanent}... \\ 5 \text{ years, 2 times}... \end{array} \right.$
Rhode Island.....							
New York.....	$\left\{ \begin{array}{l} 2 \\ 2 \end{array} \right.$	$\left\{ \begin{array}{l} 4 \\ 4 \end{array} \right.$	$\left\{ \begin{array}{l} \text{State}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{Any}... \\ \text{Elementary}... \end{array} \right.$	$\left\{ \begin{array}{l} 10 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Life}... \\ 3 \end{array} \right.$	$\left\{ \begin{array}{l} 10\text{-year periods; 2 years' teaching (Tr. sch.)}... \end{array} \right.$
New Jersey.....							
Pennsylvania.....	$\left\{ \begin{array}{l} 2-3 \\ 2-3 \end{array} \right.$		$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} 2 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Life}... \end{array} \right.$	$\left\{ \begin{array}{l} 2 \text{ years; life certificate, 3 years' experience}... \\ \text{Life; 2 years' experience}... \end{array} \right.$
Delaware.....	2	(2)	do.....	do.....	0	2	
Maryland.....	2	(2)	State....	Any.....	1	Life.	
	2	3	do.....	do.....	(3) 7		Similar period, time to time.
	2	4	do.....	do.....	(3) 10		do.....
Virginia.....	$\left\{ \begin{array}{l} 1 \\ 1 \\ 1 \end{array} \right.$	$\left\{ \begin{array}{l} 4 \\ (2, 4) \\ (2, 4) \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{Elementary}... \\ \text{do}... \\ \text{Subjects named}... \end{array} \right.$	$\left\{ \begin{array}{l} 1-3 \\ 4 1 \\ 4 1 \end{array} \right.$	$\left\{ \begin{array}{l} 7 \\ 7 \\ \text{Life}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \end{array} \right.$
	2	(2)	do.....	do.....	0	5	
	1	4	do.....	Any.....	4 7	12	Similar period, 8 years' experience.
West Virginia.....	1	4	do.....	do.....	3	6	12-year certificate, 4-years' teaching.
	1	4	do.....	Any high school.	0	5	5 years.....
North Carolina.....							
South Carolina.....							Description of certificate not given.
Georgia.....							
Florida.....							
	2	(2)	do.....	Colored schools		Life.	
Kentucky.....	$\left\{ \begin{array}{l} 1 \\ 1 \\ 2 \\ 3 \end{array} \right.$	$\left\{ \begin{array}{l} 2 \\ \text{do}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{Any}... \\ \text{do}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} 0 \\ 0 \\ 0 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} 2 \\ 4 \\ 3 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Nonrenewable}... \\ \text{do}... \\ \text{Life; 3 years' experience}... \end{array} \right.$
	2	4	do.....	do.....	1 3	Life.	
Tennessee.....	$\left\{ \begin{array}{l} 6 \\ 2 \\ 6 \end{array} \right.$	$\left\{ \begin{array}{l} 0 \\ 4 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} 0 \\ 0 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} 4 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Life certificate; 1 3 years' experience}... \end{array} \right.$
Alabama.....							
Mississippi.....							
Louisiana.....							
	2	2	do.....	do.....	0	Life.	
Texas.....	$\left\{ \begin{array}{l} 2 \\ 1 \\ 1 \end{array} \right.$	$\left\{ \begin{array}{l} 0 \\ 0 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{do}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{do}... \\ \text{Elementary}... \\ \text{Any}... \end{array} \right.$	$\left\{ \begin{array}{l} 0 \\ 0 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} 6 \\ 4 \\ 6 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Life; examination in 5 academic subjects}... \end{array} \right.$
Arkansas.....							
Oklahoma.....	6	0	do.....	do.....	0	Life.	
Ohio.....	$\left\{ \begin{array}{l} 2 \\ 2 \end{array} \right.$	$\left\{ \begin{array}{l} 4 \\ 4 \end{array} \right.$	$\left\{ \begin{array}{l} \text{State}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{Elementary and special}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} 4 2 3 \\ 4 0 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Life}... \\ 4 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Life certificate; 2 3 years' experience}... \end{array} \right.$
	2	4	do.....	do.....			
Indiana.....	$\left\{ \begin{array}{l} 2 \\ 3 \end{array} \right.$	$\left\{ \begin{array}{l} 4 \\ 4 \end{array} \right.$	$\left\{ \begin{array}{l} \text{State}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} \text{Secondary, elementary, or special}... \\ \text{do}... \end{array} \right.$	$\left\{ \begin{array}{l} 1 \\ 0 \end{array} \right.$	$\left\{ \begin{array}{l} 2 \\ 1 \end{array} \right.$	$\left\{ \begin{array}{l} \text{Reissued upon examination}... \\ \text{do}... \end{array} \right.$

Additional practice teaching required.

2 Could not be ascertained accurately.

TABLE 15.—*Certificates to which graduates and students of*

States.	Based on 4-year high-school course and 2-year normal-school course or less.						
	Years in—		Certificates valid in—		Years experience required.	Years valid.	Terms and conditions of renewal or of granting higher certificates.
	Normal school.	High school.	Territory.	Schools.			
Illinois.....	2	4	State	Any or special.	1	Life.	
	2	4	do.	do.	0	Life.	
Michigan.....	4	0	do.	Rural schools.	0	5	3 years; after 5 years' teaching
	2 or 2½	0	do.	do.	0	3	3 years; after 3 years' teaching
	1	4	do.	Any or special.	0	3	do.
	2	4	do.	Any	0	Life.	
	2	(2)	do.	do.	1	5	Nonrenewable.
Wisconsin.....	2	2 4	do.	do.	0	1	5-year certificate; 1 year's teaching.
	2	0	do.	Elementary (rural).	0	3	Renewable; 3 year's teaching; professional school, 6 weeks; credit in 2 subjects.
Minnesota.....	1	4	State	Elementary	0	3	3 years; completion of 1 year in normal school.
	2	4	do.	do.	0	2	Life; 2 years' experience.
Iowa.....	2	4	State	Any	1½	Life.	
Missouri.....	2	0	do.	do.	0	2	Nonrenewable.
	5	0	do.	do.	1	Life.	
	2	4	do.	do.	1	5	Renewable at discretion of board.
North Dakota.....	4	0	do.	do.	1	5	May be for life after 5 years' teaching.
	1	4	do.	do.	0	2	
	2	4	do.	do.	4½	Life.	
South Dakota.....	2	4	do.	do.	2	5	Renewable; successful experience and attendance at institutes.
	2	4	do.	do.	0	2	5-year certificate; 2 years' teaching.
Nebraska.....	2	4	do.	do.	2	Life.	
	2	4	do.	do.	0	3	Life certificate; 2 years' teaching.
Kansas.....							
Montana.....	3-4	4	State	Any	2	Life.	
	2	4	do.	do.	1	do.	
	1	4	do.	do.	0	4	2 years at a time, not longer than original period; reading circle course must be maintained.
Wyoming.....	2	4	do.	do.	0	2	Life certificate; 2 years' teaching.
	½	4	do.	Elementary	0	2	Same as 4-year certificate.
Colorado.....							
New Mexico.....							
Arizona.....							
Utah.....	2	4	State	Elementary	0	Life.	
	(2, 3)	(2, 3)	do.	do.	0	5	
Nevada.....	2	(2)	do.	do.	0	5	At discretion of State board.
Idaho.....	2	4	do.	Any	5	Life.	
	2	4	do.	Any or special.	2	8	At discretion of State board.
Washington.....	2	4	do.	Any	3	Life.	
	2	4	do.	do.	0	5	Life diploma after 3 years' teaching.

¹ Examination required in addition.² Could not be ascertained accurately.

TABLE 15.—*Certificates to which graduates and students of*

States.	Based on 4-year high-school course and 2-year normal-school course or less.						
	Years in—		Certificates valid in—		Years experience required.	Years valid.	Terms and conditions of renewal or of granting higher certificates.
	Normal school.	High school.	Territory.	Schools.			
Oregon.....	2	4	State ...	Elementary...	$3\frac{1}{2}$	Life...	Life certificate; $3\frac{1}{2}$ years' teaching.
	2	4	...do....	...do.....	$\frac{3}{4}$	5.....	
	2	4	...do....	...do.....	0	1.....	
California.....	2	4	...do....	Elementary or special.	$2\frac{3}{4}$	Life...	At discretion of county board; second renewal must be permanent; the first may be. Life diploma after $2\frac{3}{4}$ years' experience.
	2	4	...do....	...do.....	0	6.....	

various courses in State normal schools are eligible,—Continued.

Based on 4-year high-school course and normal course longer than 2 years.						
Years in—		Certificates valid in—		Years experi- ence re- quired.	Years valid.	Terms and conditions of re- newal or of granting higher certificates.
Normal school.	High school.	Territory.	Schools.			
{						

But 7 States do not issue certificates based upon the completion of courses in normal schools, all of which are in the two Southern divisions. They are Delaware, North Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana. However, it is probable that in some of them State diplomas of graduation from certain institutions are valid as teachers' certificates, but such authority has not been found in the school laws.

But 10 States, on the other hand, require for any certificate more than a 2-year normal course, based on a 4-year high-school course for any certificate. They are:

North Atlantic: Rhode Island, New York, New Jersey, Pennsylvania.

North Central: Ohio, Indiana, Iowa, Kansas.

Western: Montana, Nevada.

Only 3 of these do not have one or more certificates based on a 2-year normal course and a 4-year high-school course—Rhode Island, 2½; Iowa, 4; Kansas, 4. There are thus 30 States which have no certificates for normal-school graduates requiring more than a 2-year course based on a 4-year high-school course. All but 2 of these, West Virginia and Kentucky, have this high requirement for one or more of its certificates. At least 12 States have certificates for shorter courses, but of these Virginia, West Virginia, Kentucky, and Indiana require an examination in addition for these lower certificates. Four States require an examination in addition to the completion of the 2-year normal course based on the 4-year high-school course—Ohio, Indiana, Illinois, and Kansas. Four other States require experience in addition to the normal courses—Virginia, West Virginia, North Dakota, and Idaho.

States which issue life certificates to those completing normal-school courses, without experience in actual teaching, are but 5 in number—New York, Iowa from a 4-year normal course based on a 4-year high-school course, Kentucky, Oklahoma, and Utah.

CERTIFICATES BASED PRIMARILY UPON GRADUATION FROM HIGH SCHOOLS.

The following table shows the certificates that are based primarily upon graduation from high schools. For explanation of the form of the table the reader is referred to the table regarding certificates issued to college graduates, the two being identical in construction.

TABLE 16.—*Certificates based upon graduation from secondary schools,*

States.	Professional course.									
	Amount of professional work.	Certificates valid in—		Subjects examined in—			Years experience required.	Years valid.	Terms and conditions of renewal or of granting higher certificates.	
		Territory.	Schools.	Elementary.	Higher.	Professional.				
Maine.....										
New Hampshire.....										
New York.....	1 year additional.	State..	Elementary.	7	3	7	None ¹	3		5-year periods; 2 years' teaching.
Virginia.....	1 year ²	...do..	Any.....	0	0	0	0	² 3		Nonrenewable.....
Iowa.....	Graduation from normal training course.	...do..	...do....	0	0	0	0	2		County certificate issued after 36 weeks' experience.
North Dakota....	Psychology, pedagogy, and two review subjects.	...do..	Elementary.	0	0	0	0	2		3-year certificate (1st grade) after 8 months' experience.
Kansas.....	Graduation from normal training course.	...do..	Any.....	5	0	3	(⁶)	2		Similar periods indefinitely, if holder maintains progressive efficiency.
New Mexico.....										
Utah.....	2 branches	State..	Elementary.	40	0	0	2	5		Renewed, 6 hours of additional work, 3 of college grade.
Oregon.....	Not stated	...do..	Any.....	0	0	0	0	1		Renewable once; 6 months' teaching.

¹ Observation two times a week and occasional teaching during training course.² For three years if professional course is part of 4-year high-school course; for two years if part of 3-year course.³ May be extended provided holder (1) pursues professional course of study and passes examination in two subjects thereof each year; or (2) passes in two courses in the summer school of the University of Virginia or one of like grade; or (3) passes required number of subjects in examination for a professional certificate.

together with terms and conditions of renewals of such certificates.

No professional course.							
Certificates valid in—		Subjects examined in—			Years experience required.	Years valid.	Terms and conditions of renewal or of granting higher certificates.
Territory.	Schools.	Elementary.	Higher.	Professional.			
State....	Any.....	9	1	2	2, 1, $\frac{5}{8}$, 0	Life, 5, 3, 1.....	One renewal without reexamination. Life certificate when required stand-ings obtained. Extended 1 year for each 18 counts earned in examinations. May be extended. ³
...do....	Elementary.	0	0	4	0	Life or 1.....	
...do....	School des-ignated....	0	0	0	0	2.....	
...do....	Any	0	0	0	0	1.....	
.....							
.....							
.....							
.....							
State....	Any	0	0	0	0	3.....	Once without examination.
.....							
.....							

⁴ Also given by examination in 6 academic and 2 professional subjects.

⁵ Twenty weeks' practice teaching.

Two States maintain county normal training schools and issue certificates to their graduates—Michigan and Missouri.

Graduation from high school as a requirement for any certificate is becoming more and more prominent. The first State to apply this requirement to all certificates was Indiana in 1907. Such a provision went into full effect in Utah in 1911. New Jersey, Missouri, and Kansas passed similar laws gradually increasing the requirement of high-school attendance for certain certificates from one year to graduation from a 4-year high-school course. In New Jersey the law provides that every holder of an elementary certificate must, after September 1, 1911, have completed one year in an approved high school; after 1912 two years; after 1913 three years, and after 1914 must have graduated from such a school. The Kansas law puts the requirement into effect more gradually and is not so sweeping in its provision:

After May 1, 1913, no person shall be granted a certificate who has not completed at least one year of school work in an accredited high school or its equivalent, and after May 1, 1915, no person shall be granted a certificate who has not completed at least two years of high school work, or its equivalent, and after May 1, 1917, no person shall be granted a certificate who has not completed four years of high school or its equivalent: *Provided further*, That this requirement shall not apply to anyone who has taught at least six school months before May 1, 1912: *And provided further*, That the State board of education may make such temporary modifications of the requirements of this section as may be necessary to supply the schools with teachers. (Chap. 277, Feb. 28, 1911.)

The Missouri law is more liberal as regards the place and manner in which the secondary school course may be pursued. Also it is applicable to only the first and second grade county certificates. The provisions begin to become effective one year earlier than in Kansas, but do not go into full effect until 1918:

From and after September 1, 1912, all applicants for first or second grade certificates to teach must present evidence of having completed the first year's work of a classified or accredited high school as defined in section 10923, R. S. Mo. 1909, or its equivalent. From and after September 1, 1914, all applicants for first or second grade certificates must present evidence of having completed two years of such work, or its equivalent. From and after September 1, 1916, all applicants for first or second grade certificates must present evidence of having completed three years of such work, or its equivalent. From and after September 1, 1918, all applicants for first or second grade certificates must present evidence of having completed four years of such work, or its equivalent. "The high-school work herein required may be done in any public, private, or parochial school or private study and satisfactory evidence thereof presented by the written statements of parties who have personal knowledge that such work has been done or by passing a satisfactory examination on the subjects for which credit is claimed and which are not required in the examination prescribed by section 10939 of this article." (S. B. 240, Mar. 30, 1911.)

In New York the requirement applies only to "primary and grammar schools of any city or school district authorized by law to employ a city superintendent." In case the teacher does not have 3 years' successful experience or is not a graduate of a New York State normal

school, or has not a New York State certificate, she must have completed at least 3 years' work in an approved high school or academy or other approved institution of learning of equal or higher rank and in addition have graduated from a 2-year training school course. (N. Y. Education law, 1910, sec. 551.)

CERTIFICATES BASED PRIMARILY UPON EXAMINATION.

Certificates based primarily upon examination are of two classes, higher and lower. While all the certificates issued by the various States fit into this scheme, the difference in the fundamental organization of the systems in the various States causes differences in the adjustments. States whose certificates are differentiated primarily on the basis of schools in which the certificates are valid—the horizontal system—have within each class but a small number of certificates. For example, New Jersey has but two certificates each for high schools, elementary schools, etc. Thus in a vertical distribution, such as is made here, there are but few certificates to be considered in such States. On the other hand, a State having the vertical system with all or many of its certificates valid in any school furnishes a large number of certificates in such a distribution. As the latter system predominates in the country as a whole, it has seemed necessary to make the division along the lines marked out by it.

FIRST, SECOND, AND THIRD GRADE COUNTY CERTIFICATES AND THEIR EQUIVALENTS.

A better conception of all the certificates issued primarily on examination can be obtained by considering first those of the lower class. Two tables are required for these certificates. The first table deals with the county certificates as issued generally in the Central and Western States and such other certificates issued in other States as seem to be their equivalents (Table 17); the second deals with certificates slightly higher in rank (Table 22). The subjects in which examinations are required are divided into four classes, as defined on page 164. The experience requirements are all reduced to the standard of a school year of 9 months. The first table is arranged for a series of three certificates. When there are but two certificates the lower is listed under the third grade and the middle section is left blank. The first-grade certificates of certain States, as Rhode Island, are obviously of a higher standard. In certain other States, as Utah, there is but one certificate of rank corresponding to those in the table.

Under each section subdivisions are made for the years that such certificates are usually issued, for the purpose of discovering such differences as may exist between the certificates issued for the different periods.

Texas ⁹	7	1	0	0	8	1	0	2	8	1	2	1	9	4	3	1	8	1	6	2	0	0	0
Arkansas ¹⁰	9	4	0	1	9	4	1	1	9	4	1	1	9	4	3	1	9	4	1	0	0	0	0
Oklahoma	9	4	0	1	9	4	1	1	9	4	1	1	9	4	3	1	9	4	1	0	0	0	0
North Central Division:																						13	
Ohio	9	1	1	1	9	1	1	1	9	1	1	1	9	1	1	1	9	1	1	0	0	0	0
Indiana	8	2	1	1	8	2	1	1	8	2	1	1	8	2	1	1	8	2	1	0	0	0	0
Illinois	7	0	0	0	7	0	0	0	7	0	0	0	7	0	0	0	7	0	0	0	0	0	0
Michigan	8	0	0	1	8	0	0	1	8	0	0	1	8	0	0	1	8	0	0	0	0	0	0
Wisconsin	9	1	0	2	9	1	0	2	9	1	0	2	9	1	0	2	9	1	0	2	0	0	0
Minnesota ¹¹	9	1	0	0	9	1	0	0	9	1	0	0	9	1	0	0	9	1	0	0	0	0	0
Iowa	8	1	0	0	8	1	0	0	8	1	0	0	8	1	0	0	8	1	0	0	0	0	0
Missouri	9	1	0	1	9	1	0	1	9	1	0	1	9	1	0	1	9	1	0	1	0	0	0
North Dakota	8	1	0	1	8	1	0	1	8	1	0	1	8	1	0	1	8	1	0	1	0	0	0
South Dakota	9	1	0	1	9	1	0	1	9	1	0	1	9	1	0	1	9	1	0	1	0	0	0
Nebraska	9	0	0	0	9	0	0	0	9	0	0	0	9	0	0	0	9	0	0	0	0	0	0
Kansas ¹²	8	1	0	0	8	1	0	0	8	1	0	0	8	1	0	0	8	1	0	0	0	0	0
Western Division:																						13	
Montana	8	0	0	1	8	0	0	1	8	0	0	1	8	0	0	1	8	0	0	1	0	0	0
Wyoming	8	0	0	0	8	0	0	0	8	0	0	0	8	0	0	0	8	0	0	0	0	0	0
Colorado	7	0	3	2	7	0	3	2	7	0	3	2	7	0	3	2	7	0	3	2	0	0	0
New Mexico	8	0	0	0	8	0	0	0	8	0	0	0	8	0	0	0	8	0	0	0	0	0	0
Arizona					9	0	0	2	9	0	0	2	9	0	0	2	9	0	0	2	0	0	0
Utah ¹³					7	2	0	3	7	2	0	3	7	2	0	3	7	2	0	3	0	0	0
Nevada					8	2	2	1	8	2	2	1	8	2	2	1	8	2	2	1	0	0	0
Idaho	9	1	0	1	9	1	0	1	9	1	0	1	9	1	0	1	9	1	0	1	0	0	0
Washington	8	0	0	2	8	0	0	2	8	0	0	2	8	0	0	2	8	0	0	2	0	0	0
Oregon	7	1	0	2	7	1	0	2	7	1	0	2	7	1	0	2	7	1	0	2	0	0	0
California ¹⁴					9	1	7	2	9	1	7	2	9	1	7	2	9	1	7	2	0	0	0

¹ The first member of the series is the fourth-grade certificate, the second member, the third; and the fourth member, the third grade renewed. The third-grade certificate may be renewed a second time for 6 years. The second and first grade certificates in Rhode Island are not parallel to certificates of the same name in other States. The experience required for a renewal of the third-grade certificate is not definitely stated. Two years is probably a fair approximation.

² It is not altogether clear that these 2 certificates compose a series. The first is the statutory certificate; the second, the elementary. The experience required for the latter is not definitely stated.

³ Both are elementary certificates, the first is the limited; the second, the limited renewed.

⁴ Candidates for the second certificate have the privilege of choosing 2 subjects from 2 new elementary and 7 academic subjects. They are both issued at first for 6 months after election to a position, and then are extended for a maximum period of 5 years if county superintendent is satisfied of holder's fitness to teach and govern.

⁵ The second certificate—second grade—is for 1 year, higher standings being required than for the third grade.

⁶ Either the first, second, or third grade certificates may be for 1 year or 5 years. For the former if the county examination is passed; for the latter if the "State" examination. Those who are successful in the latter are given a "certificate" which compels any county superintendent to grant the holder a yearly license for 1 year during a period of 5 years from the date of said "certificate."

⁷ The highest certificate is valid for 6 years.

⁸ Either the second or first grade certificate may be granted for 4 years or for 6, according to standings received in examinations. Neither certificate has the duration indicated in the table, but each presents the nearest practicable approximation.

⁹ The lowest certificate—the third grade—is issued for one-half year, the middle certificate—second grade—for 1 year.

¹⁰ State board is authorized to prescribe additional branches for second and third grade certificates, the former valid for 2 years, the latter for 3.

¹¹ This certificate may be renewed from time to time under such regulations as State board may prescribe.

¹² This certificate is issued for 6 years. Its requirements are higher than for the usual first grade certificate.

The most common arrangement of the series of county certificates, and equivalents thereto, is that of 3 certificates granted for 1, 2, and 3 years, respectively. No less than 12 of the States have this plan, 7 of them being in the North Central division—Ohio, Indiana, Iowa, Missouri, South Dakota, Nebraska, Kansas. Two different arrangements prevail in 4 States each—the 1, 2, and 5 year series in Vermont, Virginia, Minnesota, and Washington, and the 1, 3, and 5 year series in West Virginia, Louisiana, Wisconsin, and Idaho. None of the 14 other plans obtains in more than 2 States.

Effect of duration upon examination requirements.—The differences in the duration of the lowest and middle certificates have not affected materially the examination requirements, the requirements for the 1-year certificates in certain States calling for just as many subjects as the 2-year and 3-year certificates in the other States. In the highest member of the series (first grade) there is a marked difference in the requirements for certificates of different lengths of time. The number of subjects required for the 2-year certificates is much less than the average for the 3, 4, and 5-year certificates, as is shown by the averages in the following table:

TABLE 18.—Average number of subjects required for first-grade certificates of various durations.

	Duration of certificates.			
	2 years.	3 years.	4 years.	5 years.
Standard elementary subjects.....	7.6	8.1	8.4	8.1
New elementary subjects.....	.8	1.2	0.0	1.2
Higher (secondary) subjects.....	.8	2.3	2.2	3.5
Professional subjects.....	.8	1.1	1.6	1.4

It follows that the first-grade certificates of 2 years' duration can not as a class be accepted as 3, 4, and 5 year certificates of the same grade. An exception to this principle must be made in the case of North Carolina.

Third or lowest grade of certificates.—Considering now the lowest grade of certificates issued in the several States, we find that 19 of the 47 States require examinations in 8 traditional elementary school subjects, 14 require 9 subjects, 11 require 7 subjects, 2 require 6 subjects, and 1 requires but 5 subjects.

The North Central and Western States, as a whole, require more than those of the three other divisions, which are practically on a par in this respect.

The North Central States lead in the number of new elementary subjects, 8 of the 12 States requiring them being in this division.

Four of the North Atlantic States and 5 in each of the other geographical divisions require one or more subjects. Oklahoma has 4 such subjects; North Carolina, Indiana, Utah, and Nevada, 2 each; and 22 other States 1 each. But 9 States require examination in higher subjects, and 5 of these are in the North Atlantic group.

Professional subjects are required most generally in the Western and North Central States and least frequently in the South Central and North Atlantic States. The only State requiring 3 of these subjects and 3 of the 5 States requiring 2 are in the Western division. New Hampshire, however, requires 4; 5 States, 2 each, and 18 States, 1 each, while 22 States require none.

It is patent from the above facts that the North Central and Western States have the highest requirements for the lowest grade of certificates and that their systems of certification reflect to a greater extent recent educational progress both in the widening of the curriculum and in the introduction of professional study than do the systems of the States in the other geographical divisions.

FIRST OR HIGHEST GRADE OF COUNTY CERTIFICATES.

The differences in the number of subjects required for the lowest certificate and the highest of this county series are indicated in the following table giving the average number of each of the 4 kinds of subjects required for each kind of certificate.

TABLE 19.—*Average number of subjects required for third or lowest and for first-grade county certificates.*

	Third grade.	First grade.
Traditional elementary subjects.....	7.9	8.1
New elementary subjects.....	.7	1.0
Higher (secondary) subjects.....	.3	2.6
Professional subjects.....	.8	1.3
All subjects.....	9.7	13.0

Of the increase of 3.3 subjects, 2.3 is absorbed by secondary subjects, 0.5 by professional, 0.3 by new elementary, and but 0.2 by traditional elementary subjects.

All geographical divisions are practically alike in the number of traditional elementary subjects required for the first-grade certificate, the variation in the averages between the highest and lowest divisions—the South Atlantic and the North Atlantic—being but one-half of a subject, $8\frac{1}{2}$ and 8.

The South Central States have the distinction of requiring a higher average of new elementary subjects than any other division, $1\frac{3}{5}$.

This is due to the introduction of agriculture as a subject required for a certificate in every State except Kentucky. The North Atlantic States stand next in order with an average of $1\frac{1}{8}$, then the North Central with 1, the South Atlantic with seven-eighths, and the Western States last with six-sevenths.

The North Central States lead in the average number of secondary studies required, 3.6, the other divisions following in this order, South Central, 3.25; Western, 3.13; South Atlantic, 1.5; and North Atlantic, 0.8.

The North Atlantic States lead in the number of professional subjects required, the average being 1.8, the Western States follow with 1.63; the North Central, 1.17; then the South Atlantic, 1.11; and South Central, 0.88.

In the total number of certificates required the North Central States again have the highest average, 15. The Western States have an average of 14; the South Central, 13.6; the North Atlantic, 12.2; and the South Atlantic, 12.

These differences are largely due to the differences in number of secondary subjects. The differences in the other three classes of subjects practically counterbalance each other in all the groups.

The following table shows the number of States that require the various numbers of each class of subjects. But 40 States have a first-grade county certificate or its equivalent.

TABLE 20.—*Number of States requiring each number of each class of subjects in examination for first-grade certificate or equivalent.*

Number of subjects.	Number of States requiring each number of subjects.			
	Traditional elementary.	New elementary.	Higher secondary.	Professional.
0.....	.....	13	9	6
1.....	.....	21	5	20
2.....	.....	5	6	12
3.....	.....	1	7	2
4.....	.....	1	6	.....
5.....	1	.....	3	.....
6.....	1	.....	2	.....
7.....	3	.....	2	.....
8.....	23	.....	.....	.....
9.....	12	.....	.....	.....

The examination requirements for a first-grade county certificate which would be most representative of the practice in all the States at the present time may be said to be composed of the median or average number for all the States in each of these classes of subjects, namely, 8 traditional elementary school subjects, 1 new elementary

subject, 3 secondary school subjects, and 1 professional subject—a total of 13 subjects.

The following table shows in which subjects of the three last classes—new elementary, higher, and professional—examinations are required for the first-grade certificate. An O signifies that the subject is optional. Its exponent indicates the number of subjects which must be chosen from the optional group.

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North Central Division:																							
	O ¹	O ²	O ³	O ⁴	O ⁵	O ⁶	O ⁷	O ⁸	O ⁹	O ¹⁰	O ¹¹	O ¹²	O ¹³	O ¹⁴	O ¹⁵	O ¹⁶	O ¹⁷	O ¹⁸	O ¹⁹	O ²⁰	O ²¹	O ²²	O ²³
Ohio.....																							
Indiana.....																							
Illinois.....																							
Michigan.....																							
Wisconsin.....																							
Minnesota ²																							
Iowa.....																							
Missouri.....																							
North Dakota.....																							
South Dakota.....																							
Nebraska.....																							
Kansas ²																							
Western Division:																							
Montana.....																							
Wyoming.....																							
Colorado.....																							
New Mexico.....																							
Arizona.....																							
Utah.....																							
Nevada.....																							
Idaho.....																							
Washington.....																							
Oregon.....																							
California.....																							
Total, required.....	23	14	5	13	7	3	9	12	1	6	2	3	1	1	1	1	1	1	1	1	1	1	1
Total, optional.....	2	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

¹ Certificate included in Table 22.

² A language may also be substituted.

³ Branches are fixed by the State board.

The subjects which would compose the most typical examination scheme for a first-grade certificate composed of eight traditional elementary subjects, one new elementary subject, three higher subjects, and one professional subject (see p. 187) may be said to be those which are most frequently required. As language and composition are the subjects most frequently omitted of all the main traditional elementary subjects given on page 209, the eight traditional subjects would be as follows: (1) Reading, (2), writing, (3) orthography, (4) grammar, (5) arithmetic, (6) geography, (7) United States history, including elementary civics and local history, (8) physiology, hygiene, nature and effects of alcohol, stimulants, and narcotics. Agriculture would be introduced as the new elementary subject; algebra, physics, and literature as the three higher subjects, and theory and practice of teaching as the professional subject. It may be remarked in passing that the variety of terms used to designate the professional subjects impresses one with the desirability of a more uniform terminology.

Turning to the subjects required by the individual States, it is seen that two States, Vermont and Virginia, now have the exact number of subjects required for the typical examination scheme for the first-grade certification. But 11 States can comply with this standard in all respects, although if substitutes were allowed from one class of subjects to another a number of States would be added to the list. The States that answer all the requirements, beginning with the State that requires the largest number of subjects, then the State having the next largest, and so on, are (1) Wisconsin, (2) California, (3) Idaho, (4) Texas, Oklahoma, and Nebraska, (5) Louisiana, (6) Alabama and Missouri, (7) Vermont and Virginia. The California certificate, while included in this table because it is the lowest granted, is nevertheless of a higher grade than the others. The second certificates in the New York and New Jersey schemes of certification are included in the next main table under this head because they are of higher grade. All of these more than fulfill the above requirements.

On the other hand, those States having particularly low requirements should be mentioned, beginning with the State that has the lowest number of subjects, then the next lowest, and so on—South Carolina, Tennessee, Georgia, Florida, Illinois, Oregon, Mississippi, Maine, and Connecticut.

EXPERIENCE REQUIREMENTS FOR COUNTY CERTIFICATES AND THEIR EQUIVALENTS.

There is no uniformity of practice regarding experience requirements for county certificates and their equivalents except that necessarily no State makes any experience requirement for the lowest certificate. Only 12 States require experience for the middle certificate. One

State requires more than one year, 3 States one year, and 8 States less than one year. Just one-half of the States require experience for the first-grade certificate. Two States require three years; 1 State less than three years but more than two years; 3 States, two years; 3 States, less than two but more than one year; 8 States, one year; and 7 States less than one year. The average amount for all the States is 0.68 years, and for the 24 States that require experience, 1.3 years. Our typical first-grade certificate would require 5 or 6 months' experience, which is the time approximately of the Mississippi and Nevada certificates. The North Atlantic States require the longest experience; none less than one year. But 3 of the 16 Southern States require any, while all but 3 of the North Central and all but 4 of the Western States require some teaching.

CERTIFICATES NEXT HIGHER IN RANK THAN FIRST-GRADE COUNTY CERTIFICATE.

The following table complements Table 17, which deals with the examination and experience requirements of county certificates and their equivalents. Some States have a certificate slightly higher in rank than the first grade, which it is reasonable to expect teachers of superior ability will obtain. The object of the two tables (17 and 22) taken together is to present the certificate history of the great majority of teachers in the elementary schools who obtain their first certificate upon examination and who progress from lower to higher certificates without prolonged consecutive study in educational institutions beyond the minimum required by law. Naturally the last step in such a history is the securing of a permanent license to teach or of the certificate which most nearly approaches it. The conditions for obtaining this permanent certificate are given under "Supplementary information." Conditions of renewals of certificates below the first grade will be treated in another connection (see p. 217). The remaining portion of the table needs no explanation, as in other respects it follows the forms of previous tables.

We must not lose sight of the fact, however, that in States whose systems of certification are vertical in type the county certificates are issued both to high-school teachers and elementary teachers. Many of the former who have attended college doubtless obtain the certificates described in this table as soon as they are able to meet the experience requirements. This table, therefore, serves another purpose in differentiating certain certificates that are peculiarly suited to college students who can not for some reason secure a certificate based upon college graduation. For this class of teachers this kind of certificate serves as a stepping stone from the county to the higher certificates.

TABLE 22.—*Scholarship and experience requirements of certificates based upon examinations that are next higher in rank to first-grade county certificates, together with the conditions of renewal of such certificates and of first-grade certificates. This table is the complement to Table 17.*

States.	Certificates.	Years duration.	Examination.				Years experience required.	Supplementary information, including renewals, etc.
			Traditional elementary.	New elementary.	Higher.	Professional.		
North Atlantic Division:								
Maine.....	State.....	Life.....	8	1	0	2	4½.....	Renewable 10 years on 5 years' successful experience. Elementary certificate extended 1 year for each 8 counts of academic work completed while it is in force. Proof of careful reading of four books in addition. Professional (first-grade) certificate renewable not more than 3 times by taking additional examination in 2 subjects each time. Teachers holding professional certificate 10 years may continue to teach branches covered in same district without further examination. County certificate; nonrenewable. First grade nonrenewable. Holder of first-grade certificate and 1 year's attendance in State normal schools or 2 summer sessions attendance in same institutions. Renewable for 7 years from time to time. First-grade renewable 3 to 5 years upon completion of prescribed reading. Renewable once for original period on 1 year's teaching. Holder of first-grade certificate and 1 year's experience. State examination in first-grade subjects. First-grade renewable at discretion of county superintendent. First and second grade certificates may be renewed at option of board if institutes are attended. Examination papers for first grade that in judgment of State superintendent possess unusual merit. First grade nonrenewable. Both are county certificates; but latter is valid in State for 5 years from date. First-grade nonrenewable. First-class county certificate may be renewed annually for a period of 4 years if holder has taught 8 consecutive years under first-class certificate. First-grade certificate renewable indefinitely upon successful teaching and keeping up reading-circle work. First-grade certificate nonrenewable.
New Hampshire.....	Elementary.....	Life or 1.....	7	0	1	4	0.....	
Vermont.....	Unlimited.....	do.....	8	1	3	1	(1).....	
Massachusetts.....								
Rhode Island.....								
Connecticut.....								
New York.....	Rural school renewable.....	10.....	6	2	3	4	2.....	
New Jersey.....	Elementary State.....	Life.....	9	3	8	4	3.....	
Pennsylvania.....	Permanent.....	do.....	8	1	1	2	(3).....	
South Atlantic Division:								
Delaware.....	Professional.....	10.....	8	0	0	1	0.....	
Maryland.....	Professional elementary.....	7.....	8	1	3	1	1.....	
Virginia.....								
West Virginia.....	First-grade uniform.....	5.....	9	1	2	1	0.....	
North Carolina.....	State.....	5.....	9	2	0	1	1.....	
South Carolina:								
Georgia.....	Permanent license.....	Life.....	7	1	0	1	3.....	
Florida.....	First-grade life.....	do.....	7	1	3	1	(3).....	
South Central Division:								
Kentucky.....	(State).....	8.....	9	0	3	0	2.....	
Tennessee.....	(State diploma).....	Life.....	9	0	6	0	2.....	
Alabama.....								

[illegible]

110 under first grade.

22 under professional (first-grade certificate).

320; or 4 years under first grade with average of 90 per cent.

HIGHEST CERTIFICATES BASED UPON EXAMINATION.

Every State, except Massachusetts and Utah, has a certificate based upon examination and valid for life or for the longest term for which certificates may be granted in the State. Frequently there is also a certificate slightly lower in grade and briefer in duration which serves as a preliminary certificate. In other States the requisite experience and other qualifications are obtained under a first-grade certificate or a certificate next higher in rank as given in the table just above.

Entries are made in the column for traditional and new elementary subjects whenever a new examination is required in those subjects or whenever the possession of a certificate requiring them is a prerequisite. States making such requirement neither in law or regulation have it in fact through the requirement of certain years of experience. Such experience might be gained under several various kinds of certificates, and so it is impossible to indicate the number of subjects in which examinations have been passed to obtain the certificate in question.

TABLE 23.—*Scholarship and experience requirements for highest certificates based upon examination.*

States.	Certificates.	Duration.	Examination.				Years of experience required.	Supplementary information.
			Traditional elementary.	New elementary.	Higher.	Professional.		
North Atlantic: Maine..... New Hampshire..... Vermont..... Massachusetts.....	State.....	Life.....	3	1	0	2	4½	Higher examination requirements. First-grade certificate. {Holder of second-grade certificate. First and second renewal, 6 years; third time may be permanent. {Holder of third-grade certificate. First renewal 4 years; second, 9 years; third renewal may be permanent.
	Elementary.....	Life or 1 year.....	7	0	1	4	0	
	Unlimited.....	Life.....	8	1	3	1	11	
	Massachusetts.....							
Rhode Island.....	{First grade.....	3.....	0	0	21	6	0	Nonrenewable. If remaining subjects passed, life certificate issued. Examination in branches to be taught. County certificate; nonrenewable. Examination requirements not definitely stated. One year, or 2 summer sessions' attendance in State normal school also required; renewed similar period indefinitely. Renewed similar period; 8 years' experience. 12-year certificate issued; 4 years' experience under this certificate. Nonrenewable. First-grade county certificate; renewed at option of county board. Must be a teacher in a high school or a college and taught 18 months under Florida State certificate. Nonrenewable.
	{Second grade.....		0	0	10		0	
	Honor.....	2.....	8	0	0	2	3	
	{State life.....	Life.....	6	1	12	3	3	
Connecticut.....	{State limited.....	5.....	6	1	6	3	3	Nonrenewable. If remaining subjects passed, life certificate issued. Examination in branches to be taught. County certificate; nonrenewable. Examination requirements not definitely stated. One year, or 2 summer sessions' attendance in State normal school also required; renewed similar period indefinitely. Renewed similar period; 8 years' experience. 12-year certificate issued; 4 years' experience under this certificate. Nonrenewable. First-grade county certificate; renewed at option of county board. Must be a teacher in a high school or a college and taught 18 months under Florida State certificate. Nonrenewable.
	{Secondary State permanent.....	Life.....	0	0		4	3	
	{Elementary State permanent.....	do.....	9	3	8	4	3	
	Permanent State.....	do.....	8	1	1	2	2	
Pennsylvania.....	Professional.....	10.....	8	0	0	1	0	County certificate; nonrenewable. Examination requirements not definitely stated. One year, or 2 summer sessions' attendance in State normal school also required; renewed similar period indefinitely. Renewed similar period; 8 years' experience. 12-year certificate issued; 4 years' experience under this certificate. Nonrenewable. First-grade county certificate; renewed at option of county board. Must be a teacher in a high school or a college and taught 18 months under Florida State certificate. Nonrenewable.
	Life.....	7.....	8	1	3	1	7	
	Professional elementary.....						1	
South Atlantic: Delaware..... Maryland..... Virginia.....	{First-class professional.....	12.....	9	1	10	3	4	County certificate; nonrenewable. Examination requirements not definitely stated. One year, or 2 summer sessions' attendance in State normal school also required; renewed similar period indefinitely. Renewed similar period; 8 years' experience. 12-year certificate issued; 4 years' experience under this certificate. Nonrenewable. First-grade county certificate; renewed at option of county board. Must be a teacher in a high school or a college and taught 18 months under Florida State certificate. Nonrenewable.
	{Second-class professional.....	5.....	9	1	10	3	7	
	State.....	5.....	9	2	0	1	1	
	First-grade county.....	2.....	5	1	1	1	0	
North Carolina.....	Permanent license.....	Life.....	7	1	0	1	3	County certificate; nonrenewable. Examination requirements not definitely stated. One year, or 2 summer sessions' attendance in State normal school also required; renewed similar period indefinitely. Renewed similar period; 8 years' experience. 12-year certificate issued; 4 years' experience under this certificate. Nonrenewable. First-grade county certificate; renewed at option of county board. Must be a teacher in a high school or a college and taught 18 months under Florida State certificate. Nonrenewable.
	Life.....	do.....	0	0	9	1	7½	
	State.....	5.....	0	0	9	1	4	
	Florida.....							
South Central: Kentucky..... Tennessee.....	{State diploma.....	Life.....	9	0	6	0	2	Renewed similar period, recommendation of county board. This certificate requires county superintendent to grant a license to teach. Renewable; professional reading. Sketch of applicant's school work during 5 years under first-grade certificate also required. Teacher of recognized ability and scholarly attainments. Renewable by State board.
	{State.....	8.....	9	0	3	0	2	
	Secondary (first grade).....	5.....	6	1	7	0	0	
	Life.....							
Alabama.....	Life.....	Life.....	0	0	0	2	5	Renewed similar period, recommendation of county board. This certificate requires county superintendent to grant a license to teach. Renewable; professional reading. Sketch of applicant's school work during 5 years under first-grade certificate also required. Teacher of recognized ability and scholarly attainments. Renewable by State board.
	Professional license.....	do.....	0	0	9	1	(1)	
	State.....	10.....	9	2	10	4	0	
	Permanent State.....	Life.....	8	1	14	3	(2)	

TABLE 23.—*Scholarship and experience requirements for highest certificates based upon examination—Continued.*

States.	Certificates.	Duration.	Examination.				Years of experience required.	Supplementary information.
			Traditional elementary.	New elementary.	Higher.	Professional.		
South Central—Continued.								
Arkansas.....	{ State.....	Life.....	8	1	6	1	0	Renewable indefinitely; attendance summer institutes.
	{ Life diploma.....	6.....	8	1	2	1	0	Teachers of eminent standing, who possess qualifications of high-school or grammar certificates.
Oklahoma.....	{ High-school.....	Life, 10, or 5.....	0	0	16	0	10, 5, 1	
	{ Grammar-school.....	do.....	9	4	7	1	10, 5, 1	
North Central Division:								
Ohio.....	{ High-school, life.....	Life.....	9	1	14	5	5 $\frac{1}{2}$	
	{ Common-school, life.....	do.....	9	1	5	2	5 $\frac{1}{2}$	
Indiana.....	{ Life; State license.....	do.....	8	2	8	1	3	Holder of two 36 month's licenses.
Illinois.....	{ General.....	do.....	0	0	9	2	2	Thesis is required also.
Michigan.....	{ State, life.....	do.....	8	0	12	2	2	
	{ Unlimited, State.....	do.....	8	0	14	5	2 $\frac{1}{2}$	
Wisconsin.....	{ Limited, State.....	do.....	9	1	14	4	1 $\frac{1}{2}$	
	{ First-grade, professional.....	5.....	9	1	9	4	1	
Minnesota.....	{ See remarks.....	See remarks.....	8	1	13	4	1	
	{ Second-grade, professional.....	do.....	8	1	9	4	1	Granted for limited number of years at first; permanent after 10 years' experience; to permanent teachers.
Iowa.....	{ State diploma.....	Life.....	8	1	14	2	5	Do.
	{ State.....	5.....	8	1	5	2	2	Renewable, 5 years' teaching, 3 under this certificate.
Missouri.....	{ Life, State.....	Life.....	0	0	4	4	4 $\frac{1}{2}$	Renewable.
	{ Limited, State.....	do.....	0	0	4	1	1 $\frac{1}{2}$	
North Dakota.....	{ Professional, first-grade.....	Life or 5.....	0	0	11	5	2	Renewable for term of years or for life at discretion of State board.
	{ Professional, second-grade.....	do.....	0	0	5	5	4 $\frac{1}{2}$	
South Dakota.....	{ Life diploma.....	Life.....	0	0	9	5	2 $\frac{1}{2}$	Renewable, attendance at institutes.
	{ State.....	do.....	0	0	6	0	2 $\frac{1}{2}$	
Nebraska.....	{ Professional, State.....	Life.....	9	2	13	1	1	
	{ Life diploma.....	do.....	8	2	10	6	5	
Kansas.....	{ Life certificate.....	do.....	8	2	7	6	3	
	{ 3-year renewable.....	3.....	8	2	7	6	1	Life certificate, 2 years' experience.
Western division:								
Montana.....	{ Life diploma.....	Life.....	8	0	15	2	7 $\frac{1}{2}$	Renewable, conditions not specified.
	{ State certificate.....	6.....	8	0	7	1	3 $\frac{1}{2}$	Renewable as long as holder continues to teach and gives county superintendent satisfactory evidence of progress and efficiency.
	{ Professional certificate.....	4.....	8	0	5	1	1 $\frac{1}{2}$	
Wyoming.....	{ Professional, first-class.....	Life.....	8	0	12	3	3	
	{ Professional, second-class.....	do.....	8	0	7	2	2	
Colorado.....	{ State diploma.....	do.....	0	0	0	5	2 $\frac{1}{2}$	Preparation equivalent to college graduation, including professional course.

New Mexico.....	{ Life certificate.....	4	0	16	5	.....
	{ 5-year certificate.....	4	0	12	5	.....
Arizona.....	{ Life diploma.....	4	0	12	4	.....
	{ Educational diploma.....	9	0	2	6	6
Nevada.....	{ Life diploma.....	4	0	12	2	5
	{ High-school certificate.....	4	0	10	1	8
Idaho.....	{ Life certificate.....	4	0	10	1	0
	{ State certificate.....	.....	.....	.....	.....	.....
Washington.....	{ Life certificate.....	8	3	11	4	5
	{ Professional certificate.....	8	3	8	2	23
Oregon.....	{ Life, State certificate.....	7	1	11	3	63
	{ State certificate.....	5	.....	.....	.....	11
	{ Life diploma, high-school.....	7	1	4	3	23
California.....	{ Life.....	.....	.....	.....	.....	.....
	{ Life diploma, grammar.....	9	1	7	2	23
	{ do.....	.....	.....	.....	.....	.....

¹ Varies.

² Not specified.

Nonrenewable.

Renewable at discretion of State board.

As required by State board. Applicant must be holder of State certificate. As required by State board. Applicant must be holder of first-grade certificate. Renewable at option of State board.

Renewable indefinitely, 24 months' teaching or 1 year's attendance at higher institution of learning.

Renewable indefinitely 1 year's attendance at higher institution of learning. Equivalent of graduation from University of California and 1 year's post-graduate work, including practical teaching.

It will be seen from the above table that the number of traditional and new elementary subjects required in the examinations for the highest certificates does not differ materially from the number required for the first-grade certificate. It is necessary, therefore, to analyze only the requirements for secondary and professional subjects. These do not differ in name from those required for the first grade, except that higher professional subjects, as school administration, higher educational psychology, and history of education, are given more prominence. The examination questions are in almost all cases of greater difficulty and the grading is done more closely than in the lower certificates.

The North Central States require a larger number of secondary subjects than any other section—an average of 11.9 for the States represented in the distribution. The South Central States have an average of 8.75; the Western of 8.4; the North Atlantic of 5.3; and the South Atlantic of 3.3. One-fourth of all the States require 1 subject or none, while another fourth requires 12 or more. One of two middle fourths of the States requires from 1 to 8, the other from 8 to 11, inclusive. The median is 8.5 subjects.

The order of the divisions for the average number of professional subjects required is the same as for academic subjects, except that the South Central moves down two places and the Western and the North Atlantic move up one place each. The average for the States represented in each division is as follows: North Central, 3.5; Western, 3.1; North Atlantic, 3; South Central, 1.6; South Atlantic, 1.3. Three more than one-fourth of the States require but 1 professional subject or none, while one less than one-fourth of the States require 5 or 6 subjects. One-half of the States require 2 or less, the other half 3 or more—the approximate median being 2.9.

The tables showing the number of States having each of the various numbers of secondary and professional subjects follow:

TABLE 24.—*Number of States having each number of higher subjects.*

Number of subjects.	Number of States having each number of subjects.
0.....	7
1.....	6
2.....	1
3.....	2
4.....	1
5.....	0
6.....	2
7.....	2
8.....	1
9.....	4
10.....	3
11.....	3
12.....	3
13.....	2
14.....	3
15.....	1
16.....	2
17.....	0
18.....	0
19.....	0
20.....	0
21.....	1
Total.....	44

TABLE 25.—*Number of States having each number of professional subjects.*

Number of subjects.	Number of States having each number of subjects.
0.....	3
1.....	11
2.....	9
3.....	5
4.....	6
5.....	7
6.....	3
Total.....	44

Great differences in the number of subjects required in both classes of studies, both as to geographical divisions and individual States, are evident. The highest standard prevails in the North Central States and the lowest in the South Atlantic, the differences in the averages for the secondary and professional subjects being 8.3 and 2.2, respectively. These differences are probably greater than exist between certificates in any other class.

A certificate of the highest type, based upon examination in the various States that would best represent the present status of certification in the United States, as a whole, would be composed of 8 traditional elementary subjects, 1 new elementary subject (as holds true for the first-grade certificate), 9 higher subjects, and 3 professional subjects—an increase above the first grade of 6 higher and 2 professional subjects.

PRIMARY, KINDERGARTEN, AND SPECIAL CERTIFICATES.

The same essential facts relating to scholarship and experience requirements that have been given for certificates based upon educational courses and upon examinations are given in the three following tables for certificates valid to teach (1) in primary grades and kindergartens, (2) in special subjects, (3) as supervisor. Circumstances do not permit an analysis of these tables. It may be

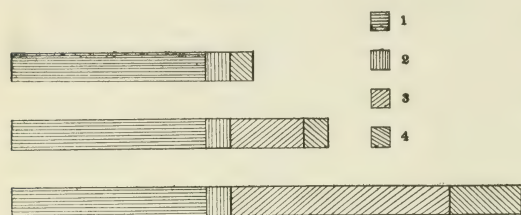


FIGURE 9.—Subjects required in examination for the typical third-grade county certificate (top rectangle), for typical first-grade county certificate (middle rectangle), and for typical highest certificate issued upon examination (bottom rectangle.) 1=traditional elementary subjects; 2=new elementary subjects; 3=higher (secondary and college) subjects; 4=professional subjects. (See p. 205.)

primary and kindergarten certificates of the same general character as regular certificates with special qualifications. Three States require examinations much like the regular examinations, with the special branches added. Other States look upon these as special certificates, and in consequence the scope of the examination is much more limited. As regards duration, the tendency seems to give these certificates longer terms than county certificates. Renewals are made in ways similar to those for county certificates.

said in general, however, that a few States require that the qualifications of a regular certificate be met as well as those for teaching special subjects; but the majority of the States confine their inquiries into the qualifications of applicants in the special and professional branches. In some States the tendency is to regard

TABLE 26.—*Scholarship and experience requirements for primary and kindergarten certificates.*

[P=Primary certificate or special certificate for primary grades; K=Kindergarten certificate or special certificate for kindergarten; S=Special subjects (kindergarten or primary methods, etc.); T=Thesis required in addition to examination.]

States.	Duration.	Years in college.	Years in normal school.	Years in high school.	Examination.				Years' experience.	Conditions and terms of renewal.
					Traditional.	New elementary.	Higher.	Professional.		
North Atlantic Division:										
Vermont (P. and K.)	5.....		2	(?)					7	After holder has obtained certificate upon examination.
Rhode Island.....	2.....	(1)	(1)	(1)	(1)	(1)	(1)	(1)	0	4 years, then 9 years, then permanent.
Connecticut (K.).....	(2).....				5	3	1	1	0	Successful teaching.
New York (K.).....	(1).....				5	3	1	1	0	Do.
	3.....	4, 2	4	0	0	0	0	6	0	5-year periods; 2 years' experience.
New Jersey (K.).....	Life.....		2	4					2	
(K.).....	do.....		4	S.	S.	S.	S.		3	
(K.).....	1.....		2	4					0	2 years; then life; 3 years' teaching.
Pennsylvania (K.)....	Life.....		2							
South Atlantic Division:										
Virginia (K.).....	5.....		1	(?)					0	Similar period; professional reading course.
West Virginia (P.)....	5.....				9	6	0	4	2	Once, 1 year's teaching.
Florida (P. and K.)....	(1) Life.....								4	
	(4).....			(2)	(2)	(2)	(2)	(2)	0	Life certificate 4 years teaching.
South Central Division:										
Texas (K.).....	Life.....		2	(?)					3	
Oklahoma (P.).....	Life, 10, or 5.....	4			8	4	0	1	10, 5, 1	Higher certificates issued.
(P.).....	do.....				9	4	3	1	10, 5, 1	Do.
(K.).....	do.....		2						10, 5, 1	Do.
(P.).....	10.....									
North Central Division:										
Indiana (K.).....	Life.....		2	4					0	
(K.).....	1.....		4	0	3	0	1		0	Reissued upon examination.
(P.).....	3, 2, or 1.....		3	4	8	2	1	1	3, 1, 0	3-year permanent; 6 years teaching.
Michigan (K.).....	Life.....		2	4	8	0	0	1	0	
(P.).....	1.....				8	1	0	1	3	Continuous teaching; average 85 per cent in 2 examinations.
Wisconsin (K.).....	Life.....		2						1	
(K.).....	1.....		2						0	Life certificate 1 year's teaching.
(K.).....	4.....				6	4	2	2	3	Nonrenewable.
(K.).....	2.....				6	3	2	1	0	Do.
Iowa (P. and K.).....	1.....				6	3	0	1	0	Do.
(P. and K.).....	5.....				0	4	0	5	0	Life, 5 years' teaching.
North Dakota (P. and K.).....	3.....				S.	S.	S.	S.	0	Do.
	Varies.....		2	4	S.	S.	S.	S.	0	Not prescribed.
(P. and K.).....	do.....		2	4					1	Do.
(P. and K.).....	do.....				8	1	0	S.	0	Do.
(P. and K.).....	do.....				S.	S.	5	5	1	Do.
South Dakota (P.)....	5.....				8	1	0	2	0	
Western Division:										
Wyoming (P. and K.)...	4.....				8	0	0	5	4	Reissued upon examination.
Utah (P.).....	2.....			4	7	2	0	3	0	Year by year under regulation of State board.
Washington (P.).....	(1) Life.....				8	3	2	2	7	
	(5).....				8	3	3	2	5	2 years' teaching or 1 year's attendance at higher institution. Indefinitely.
Oregon (P.).....	5.....				3	0	0	T3	1½	Indefinitely on (a) 1 year's attendance higher educational institution; (b) 3½ years' teaching.
	Life.....	(8)	(3)	(3)	(3)	(3)	(3)	(3)	0	
California (P. and K.)	(1) Life.....		2	4					2½	
	(6).....		2	4					0	Life certificate 2½ years teaching.

¹ Discretion of State board.² Indefinite.³ Discretion of State superintendent.

TABLE 27.—*Scholarship and experience requirements for special certificates.*

[S=Special subjects in addition to those indicated, if any; HHS=certificates for high-school subjects only; T=Thesis.]

States.	Years' duration.	Years in college.	Years in normal school.	Years in high school.	Examination.				Years' experience.	Conditions and terms of renewal.
					Traditional.	New elementary.	Higher.	Professional.		
North Atlantic Division:										
Vermont.....	5..... (2)				8	1	0	1	(1) $\frac{1}{2}$	Successful teaching. After holder has obtained 1st or 2d grade certificate.
Rhode Island.....	2.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	0	4 years, then 9 years, then permanent.
Connecticut.....	2..... (3)		4, 2		8	0	0	1	0	Successful teaching.
New York.....	3..... (Life)		4, 2		S.	S.	S.	S.	0 2	5-year periods, 2 years' experience. Do.
New Jersey.....	do..... (1)		4 4		S.	S.	S.	S.	0 0	2 years, then life; 3 years' teaching.
Pennsylvania.....	Life.....		2						0	
South Atlantic Division:										
Virginia.....	5.....		1		8	1	3	1	(1)	Similar period; professional reading course.
Virginia (HS).....	5.....		S, 2		S.	S.	S.	S.	(1)	Do.
North Carolina (HS).....	3.....		4		S.	S.	S.	2	0	Do.
Florida.....	5.....				(1)	(1)	(1)	(1)	0	Reissued upon examination. Do.
South Central Division:										
Oklahoma (HS).....	Life, 10 or 5.....	4 $\frac{1}{2}$							10, 5, 1	Higher certificates issued.
North Central Division:										
Life.....	do.....		2	4	1	S.	S.	S.	4	10
do.....	do.....		2	4	S.	S.	S.	S.	1	2 $\frac{3}{4}$
do.....	do.....		2	4	S.	S.	S.	S.	1	10
do.....	do.....		2	4	S.	S.	S.	S.	1	0
Ohio.....	8 or 5.....				S.	S.	S.	S.	1	4 $\frac{3}{4}$
	3, 2, or 1.....				S.	S.	S.	S.	1	0
Indiana.....	1.....		$\frac{3}{4}$	4	S.	S.	S.	S.	0	Life, 4 years' experience. Renewed unless holder has not taught during 4 years preceding.
	1.....		$\frac{3}{4}$	4	3	S.	S.	S.	0	Life, 4 years' experience.
Illinois.....	Life.....		2 $\frac{3}{4}$	4	0	0	0	3T	0	Reissued upon examination. Do.
(1).....					S.	S.	S.	S.	0	Discretion of county superintendent.
Michigan.....	Life.....		1, 2						0	
Wisconsin.....	do.....		2						1	
	1.....		2						0	Life certificate, 2 years' teaching.
Iowa.....	5.....				0	4	0	5	0	Life, 5 years' teaching.
	3.....				S.	S.	S.	S.	0	Do.
	Varies.....		2	4					1	Not prescribed.
North Dakota.....	do.....		2	4	S.	S.	S.	S.	0	Do.
	do.....				S.	S.	5	5	1	Do.
	do.....				8	1	S.	S.	0	Do.
	1.....				S.	S.	S.	S.	0	2 years if teaching is satisfactory.
Kansas.....	1.....		1, 2						0	Do.
Western Division:										
Wyoming.....	4.....		4						0	Life, if professional subjects passed.
	4.....				S.	S.	S.	S.	0	Reissued upon examination.
Arizona.....	4.....		2						1	3 years' teaching.
	4.....				5	4	4	S.	0	
Utah.....	5.....				(3)	(3)	(3)	(3)	0	Not specified.
Nevada.....	2.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	0	2 years if holder continues teaching.
Idaho.....	8.....		2	4					0	
Washington.....	(4).....	(4)	(4)	(4)	(4)	(4)	(4)	(4)	0	Valid so long as holder teaches.
California.....	Life.....				2	S.	S.	1	5	
	6.....				2	S.	S.	1	0	5 years' teaching in same county.

¹ Indefinite.² Discretion of State board.³ Discretion of State University.⁴ At discretion of county superintendent.

SUPERVISORS' CERTIFICATES.

Supervisors' certificates, issued in 7 States, usually have the requirements for the highest grades of certificates granted either upon the basis of completion of educational courses or upon examination plus certain professional requirements, in which school administration has the most prominent position. The certificates are usually for life and require previous experience, as that of supervisor in a minor position.

TABLE 28.—*Scholarship and experience requirements for supervisors' certificates.*

States.	Years duration.	Years in college.	Years in normal school.	Years in high school.	Examination.				Years experience.
					Traditional.	New elementary.	Higher.	Professional.	
Maine.....	Life.....				0	0	0	6	5.....
New Hampshire.....	do.....	4			0	0	0	6	2.....
	do.....	4			0	0	0	6	10 as superintendent.
	do.....		2½	4					do.....
Rhode Island.....	do.....	1 5							5 as superintendent.
	do.....			4					10 as superintendent.
	do.....	1 1		4					5 as superintendent.
	do.....				8	0	1	6	Indefinite.....
Connecticut.....	do.....	4						6	do.....
	do.....	2	4					6	do.....
	do.....		4					6	5 as superintendent.
	do.....	4 or 4	4	1	0	(?)	5		4 as supervisor.....
	do.....	4	4	1	0	(?)	5		1 as supervisor, 5 as teacher.
New Jersey.....	Life.....			4	9	3	8	4	4 as supervisor.....
	do.....			4	9	3	8	4	1 as supervisor, 5 as teacher.
	Life.....			4	9	1	3	2	4 as supervisor.....
	do.....			4	9	1	3	2	1 as supervisor, 5 as teacher.
Oklahoma.....	Life, 10, or 5.				8	4	8	5	10, 5, or 1.....
Illinois.....	Life.....	4 or 2	4	0	0	1	2	T	2 as teacher supervisor.
	do.....				0	0	1	2	10 as supervisor.....
	do.....	1 4	4						0.....
Wyoming.....	do.....	4	4	0	0	0	2		2.....
	do. ²			8	0	7	4		3.....
	do. ²	2	4						1.....
	do. ²			8	0	5	3		2.....
	do.....	1 4	4						3½.....
Oregon.....	do.....	2	4						3½.....
	5.....	1 4							3.....

¹ Professional course.² Valid only in schools having not over 2 years high school.

SOME COMMENDABLE FEATURES IN SCHOLARSHIP AND EXPERIENCE REQUIREMENTS.

The requirements for high-school graduation and for normal training in certain States have already been described.

It seems that scholarship requirements are going to lay more emphasis on completion of courses in educational institutions and less on examinations. The revised regulations of the Virginia State

board of education relating to certification, and the regulations of the education department of the State of New York relating to teachers' certificates, are in advance of all other legal enactments in this respect. By reason of their authority over both the normal schools and the systems of certification, each of these States has been able to bring the two elements into very close relation. Certain certificates are granted only upon the completion of prescribed or approved courses, and provision is made for the normal school giving such courses as are prescribed. Renewal and extension of certificates are likewise made dependent upon securing credits for work proposed in prescribed courses in the regular or summer sessions of State normal schools or in training schools or classes. Comparatively few of the certificates of these States are based upon examination alone, provision being made for certification of graduates from universities, colleges, normal schools, training schools, high schools, and summer schools. (See Table I, Scholarship Requirements.)

Indiana likewise has specified normal courses which must be completed before the various grades of certificates are granted; but in this State the examination requirements still remain and, in fact, are of equal importance and possibly are fundamental.

A combination of measurement of experience and of educational qualifications is found in the Indiana scheme of dividing its teachers into three classes, as follows:

Class A.—A teacher without experience: Shall be a graduate of a high school or its equivalent; shall have had not less than one term of 12 weeks' work in a school maintaining a professional course for the training of teachers; shall have not less than a 12 months' license.

Class B.—A teacher with 1 year's experience: Shall be a graduate of a high school or its equivalent; shall have had not less than two terms of 24 weeks' work in a school maintaining a professional course for the training of teachers, or the equivalent of such work; shall have not less than a 2 years' license; shall have a success grade.

Class C.—A teacher with 3 or more years' successful experience: Shall be a graduate of a high school or its equivalent; shall be a graduate from a school maintaining a professional course for the training of teachers, or its equivalent; shall have a 3 years' license or its equivalent; shall have a success grade.

Provided that for teachers already in the service successful experience in teaching shall be accepted as an equivalent for high-school and professional training, as required by all the above classifications.—(From Laws, 1907, ch. 101, sec. 2.)

Maine has a plan of determining the duration of certificates according to the nature of the qualifications of the candidates, which is of interest:

The period for which the certificate is granted is determined primarily by facts of experience, as stated on reverse of certificate. For a life certificate, as determined by these facts alone, the candidate must have actually taught at least 18 terms; for a 5 years' certificate, at least 9 terms; and for a 3 years', at least 5 terms. For any less than 5 terms of actual teaching the 1 year's certificate is granted. The force of these facts is, however, modified, first by graduation from normal school, such graduation counting

as the equivalent of an actual experience of 3 terms; second, by conditions of rank in written examination, a very low rank in one or more subjects as compared with average rank reducing the term on the assumption that the candidate will desire to attain higher rank and thus a higher grade of certificate, and so will wish the sooner to take a reexamination; third, by extent of professional reading, the candidate who has evidently read little in this direction being granted certificate of shorter term than might otherwise have been granted. On the other hand, especial excellence in ranks attained in examination or in estimates of references, will serve as an equivalent for some small lack of experience. A 5 years' certificate, for example, may thus be granted when the number of terms taught is only 7 or 8 instead of the full number required primarily.

MEASURING EFFICIENCY OF TEACHERS.

In three States methods for the determination of the efficiency of teachers have been adopted. The plan used in Indiana is the most definite. A pamphlet issued by the State superintendent describes it thus:

In determining the "success grade" of each teacher in service the city, town, and county superintendents are required by law to use the following scheme: (1) Teaching power, 45 per cent; many items enter into this, but the principal ones are preparation of lesson, skill in presentation, and results attained; (2) government, 35 per cent; the teacher's power in government is shown in the general spirit of the school, and in the attitude the pupils take toward their daily tasks, toward each other, and toward the school property; (3) general characteristics, 20 per cent; under this head the personality of the teacher, his professional and community interest, and all those qualities that make for the best citizenship should be considered. (From Indiana Teachers' Licenses, Charles A. Greathouse.)

In Maryland four factors enter into the analysis, but no grading scheme is provided. The law reads as follows:

On or before the 1st day of October of each year the county superintendent shall submit to the county school board a list of all teachers employed, together with a classification of their certificates. In determining the class of the certificates the following points are to be considered: (a) Scholarship, (b) executive ability, (c) personality, and (d) teaching power. The county superintendent may add such other requirements as may be approved by the State board of education. (Public School Laws of Maryland, 1910, pp. 32-33.)

In Maine the experience is apparently not rated altogether by school officials, as is the case in the two other States:

The applicant is required to furnish the names of 5 references, to 3 of whom are sent circular letters asking each to estimate the applicant's fitness as excellent, good, fair, poor, or very poor in each of the following points except the last named: Moral character, success in gaining cooperation of pupils and parents, tact in directing and controlling pupils, interest in work, energy, enthusiasm, skill in instructing, power in stimulating pupils to do their best, influence over pupils out of school, efforts for self-improvement, extent of general reading, manners as influencing those of pupils, capacity for work, for what kind of school would you recommend the candidate.

These statements are then graded by the State superintendent according to the following scale: Excellent, 90 to 100 per cent; good, 70 to 90 per cent; fair, 50 to 70 per cent; poor, 30 to 50 per cent; and very poor, 1 to 30 per cent. The average of the 3 reports determines the rating for each element of fitness.

Minimum salaries are fixed for each class of teachers in both Indiana and Maryland. This fact constitutes a powerful incentive toward increased efficiency in teaching.

Complaint has often been made that the examinations as at present conducted are not satisfactory tests of the knowledge and ability of the applicants. Connecticut has a unique plan which has for its object the avoidance of some of these shortcomings. It involves the submission of "preliminary papers" showing evidence of professional study and an "oral" test in the various subjects. The circular of the State education office No. 21, 1909 (pp. 9-16), describes the process for the elementary certificate as follows:

ELEMENTARY CERTIFICATE.

PRELIMINARY PAPERS.

Candidates can not be admitted to examination for an elementary certificate unless on or before the day of examination they have sent to the secretary of this board satisfactory papers giving evidence of professional study.

In preparing these papers candidates are urged to make use of every available help, and the language of books may be copied, provided the matter quoted is indicated. They must, however, expect to be examined with especial strictness on the subject-matter of their papers, and must be prepared to show that all which they have written represents knowledge which they can readily use in teaching. These papers may be short, but they have great weight in determining the fitness of the candidates. They may be questioned orally upon the subject matter of these papers.

The following papers must be presented:

English.—1. A paper describing the candidate's method of teaching children to read.

This paper must be divided into three parts: (1) Giving a plan of teaching beginners; (2) a plan for teaching those who can use books; (3) the special uses of oral and silent reading.

2. A paper describing the candidate's method of teaching children to express themselves easily and clearly, both in speaking and in writing.

The use to be made of (1) copying, (2) dictation, (3) oral statement, and (4) composition should be given.

3. A paper giving a few books with which the candidate is familiar under the following heads:

- | | |
|-------------------------------|--------------|
| (1) Books for young children. | (4) History. |
| (2) Poetry. | (5) Science. |
| (3) Biography. | (6) Fiction. |

A summary of one of the books may be required.

The author, title, and publisher of each book must be given.

4. (1) A list of useful school reference books.

(2) A list of not more than twenty books which ought to be in a school library.

The author, title, and publisher of each book must be given.

5. A paper describing the kind of literature which should be used (1) in teaching children the beginnings of reading, with selections or references to books; (2) the kind of literature to be used in the later practice of reading.

This paper should also describe the extent to which the teacher would go in studying English literature with children, and in particular give a list of books—

(a) which should be read in school.

(b) which young children should be induced to read to themselves.

The lists should be carefully selected, but may be very brief.

If possible, these books should be arranged for the stages of school progress.

6. A paper giving—

(1) A list of important points of English usage on which children need of special drill. The correct forms of expression and the incorrect forms to be avoided should be given.

(2) A method of teaching punctuation, and the written forms of the language may be here included.

(3) In this paper candidates should also state and illustrate what elements of English grammar can be used in securing correct written and spoken language.

7. A paper describing the candidate's method of teaching spelling.

Penmanship.—A paper describing the candidate's plan of teaching children to write.

This paper must include the small and capital letters as they would be taught to children.

Small charts containing small and capital letters will be sent.

Arithmetic.—1. One paper giving the facts of number to and including 10.

2. One paper describing the candidate's plan of oral and written work under all topics mentioned on page 214, especially showing how children may be taught to work practical problems with facility.

Elementary science.—Two papers, each describing the candidate's plan of a lesson to be given to children.

It is recommended that one paper shall describe a lesson in chemistry and one a lesson in physics, geology, or botany.

Each paper must give (1) age of children for whom the lesson is intended; (2) purpose of giving the lesson; (3) concise description of apparatus, experiments, or object of observation—supplemented by any necessary diagrams or drawings; (4) method of teaching the lesson.

The following topics suggest some of the more important subjects with which the candidates must be familiar:

air	expansion
oxygen	circulation of water—of air
nitrogen	winds and currents
hydrogen	evaporation
candle flame	condensation
carbon dioxide	melting
gravitation	freezing
three states of matter	rain, snow
pressure in solids, liquids, and gases	dew, frost
fog, cloud	sound
vapor and climate	common minerals
conduction	rock disintegration
sources of heat	soil formation
cohesion	soil transportation
magnetism	work of rain, rivers, and ice
telegraph	organic rock
electric lamp	sedimentary rock
steam engine	fossils
transmission of pressure	

Geography.—1. One paper describing a plan of lesson for young children.

2. One paper giving topics of lesson for older scholars, and suggestions as to the way in which the scholars should prepare such a lesson.

3. A list of books which children may profitably read in connection with this subject.

The author, title, and publisher of each book must be given.

4. A short list of reference books useful for a teacher.

The author, title, and publisher of each book must be given.

Physiology.—1. One paper giving parts of the subjects most important for school children and the object of teaching each.

2. One paper describing a plan for a single lesson, stating:

(1) Age of children; (2) purpose of the lesson.

History.—1. One paper giving the object and uses of studying history in public schools.

2. One paper giving a list of books which may be read by children in connection with this subject.

The author, title, and publisher of each book must be given.

3. One paper describing a plan of a single lesson in history.

Civil government and duties of citizenship.—A paper describing a plan of a single lesson in civil government and the duties of citizenship.

School management.—1. A paper suggesting principles and rules for grouping and classing scholars.

2. A paper describing clearly the method of keeping registers of attendance. The candidate will fill out a register for three terms of 12 weeks each, using not less than five names. The register should be complete, and the method of obtaining the average attendance should be indicated for each term. All the work performed in obtaining averages for each term should be left on the proper page of the register.

State register containing directions will be sent on application.

3. A paper showing acquaintance with the laws of the State relating to instruction, attendance, employment of children, and the duties of teachers.

The laws relating to schools will be sent on application.

EXAMINATIONS.

Preliminary papers.—Candidates must show a thorough practical understanding of all that they have written in the papers presented before the examination. They may be questioned orally upon the subject matter of these papers.

In order to pass the examinations and receive an elementary certificate, candidates must satisfy all the following requirements:

Penmanship.—They must furnish evidence that they can teach penmanship.

One test will be making on the blackboard or on paper the small and capital letters as they should be made in teaching children.

Reference is made to the following books, which will be loaned on application:

Parker, Talks on Teaching, pages 75-79.

Farnham, Sentence Method of Teaching Reading, Writing, and Spelling.

Prince, Courses and Methods, pages 66-73.

Charts containing the small and capital letters, topics, and questions hitherto used will be furnished on application.

Reading.—Candidates must furnish evidence that they can teach reading. Mere ability to read is not sufficient. A definite method of procedure with beginners and with those who can read books will be required. Candidates must also be ready to answer questions upon books which they themselves have read.

The following references on the subject of reading will be loaned on application:

Farnham, The Sentence Method of Teaching Reading, Writing, and Spelling.

Hall, How to Teach Reading and What to Read in Schools.

Parker, Talks on Teaching, pages 26-66.

McMurray, Special Method in Primary Reading and Oral Work with Stories.

Welch, Right Reading for Children.

Boston, Mass., board of supervision, Method of Teaching Reading in the Primary Schools.

Topics and questions hitherto used will be sent on application.

Spelling.—They must be able to spell and pronounce common words.

Under this subject will be given questions relating to pronunciation, the use of the dictionary, abbreviations, and diacritical marks.

See Penniman, J. H., New Practical Speller.

Questions hitherto used will be sent on application.

English.—1. They must show a good knowledge of punctuation and capital letters.

2. They must be able to write and properly address a letter of any ordinary nature.

3. They must be able to state clearly in their own language the substance of any short selection, and to write briefly on a subject given in the examination.

4. They must show a good knowledge of the elements of English grammar.

Topics and questions hitherto used will be sent on application.

English literature.—They must have studied some topics in English literature, and be able to write intelligently, in correct English, in answer to simple questions upon this topic.

The topics and questions hitherto used will be sent on application.

Books listed in the topics will be loaned.

Arithmetic.—They must be able both to figure and to work out simple practical problems in the following subjects ordinarily taught as parts of arithmetic:

addition
subtraction
multiplication
division
common and decimal fractions
percentage (including among its applications simple interest, stocks, commissions, and profit and loss)
common weights and measures and their applications
the metric system
mensuration of plane surfaces and of rectangular solids
ratio and proportion
square and cube root

They must also know how to keep a cash account and make out bills and receipts.

Topics, charts, and questions hitherto used will be sent on application.

Elementary science. They must have a good elementary knowledge of one subject chosen for their preliminary papers in science.

See under elementary science, page 212.

School Document No. 12, 1903, Lessons on Plants, by H. N. Loomis, and questions hitherto used will be sent on application.

Reference is made to the following, which will be loaned on application:

Huxley, Science Primer. Introductory.

Roscoe, Science Primer. Chemistry.

Stewart, Science Primer. Physics.

Geikie, Science Primer. Geology.

Bower, Science Applied to Work.

Buckley, A. B., Short History of Natural Science.

Geography. They must—

1. Understand the elements of mathematical geography.
 2. Be able to locate the principal divisions of land and water of the world.
 3. Be able to locate the chief political divisions of the world and the States and Territories of the United States.
 4. Be able to describe the important physical features of North America and of Europe.
 5. Show a good knowledge of certain topics ordinarily taught as a part of geography.
- These topics will be sent on application.

The following books are referred to, and will be loaned on application:

Grove, Science Primer. Geography.

Geikie, Science Primer. Physical Geography.

Shaler, The Story of our Continent.

Shaler, First Book of Geology [with teacher's pamphlet].

Brigham, Geographic Influences in American History.

Topics and questions hitherto used will be furnished.

Physiology. 1. They must be able to do (at least sufficiently for some elementary instruction) the work required of teachers in the textbook on physiology prepared by Dr. J. K. Thacher and A. B. Morrill.

This book and charts will be sent to those who wish to prepare themselves on this subject.

2. They must be acquainted with the law relating to the teaching of physiology and hygiene.

The law is found in general statutes, sections 2162, 2163, 2245. The laws relating to schools will be sent on application.

History. They must be able to show a good knowledge of certain topics in history. These topics will be sent on application.

Reference is made to the following books, which will be loaned:

Hart, Suggestions on History and Government of United States. Cambridge.

Bourne, Teaching of History and Civics.

Gordy & Twitchell, Pathfinder of American History.

Atkinson, On History and the Study of History.

Atkinson, The Study of Politics.

Seiple, American History and its Geographic Conditions.

Duties of citizenship. They must be able to show a satisfactory knowledge of certain topics in duties of citizenship. These topics will be furnished on application.

The following reference books will be loaned:

Fiske, Civil Government in the United States.

Forman, First Lessons in Civics.

See also under history.

Vocal music and drawing are not now required except for kindergarten certificate. If satisfactory evidence of ability to teach these branches be furnished, they will be noted on the certificate.

Undoubtedly this State has taken the most advanced ground in this feature of examination and certification of teachers. The plan deserves a careful and extended trial in other States as well.

Connecticut has also another unique method of determining the qualifications of applicants. Teachers for advanced certificates are required to demonstrate their ability to teach by actual test. It would be of great benefit to other States if more were known of the experience that has been met in the carrying out of these two plans for testing knowledge and practice.

Utah and New Mexico, by stating their scholarship requirements in the form of "credits," place a premium upon attending educational institutions and thus promote a good tendency, although these credits may be earned in examination as well as in school.

California has the highest requirements for teachers' certificates of all the States. Her minimum is far above the maximum for elementary teachers in many States. The character of the requirements for the necessary year of postgraduate work for high-school teachers is of the greatest interest. The requirements of the board in this respect are as follows:

High-school certificates may be issued under the provisions of section 1521, subdivision 2 (a), and section 1775, subdivision 1 (a), of the political code of California, as follows:

(a) To candidates who have received the bachelor's degree from a college requiring not less than 8 years of high-school and college training, and who submit evidence that in addition to the course required for the bachelor's degree they have successfully completed at least 1 year of graduate study in a university belonging to the Association of American Universities; which year of graduate study shall include one-half year of advanced academic study (part of the time, at least, being devoted to one

or more of the subjects taught in the high school), and such other times in a well-equipped training school of secondary grade directed by the department of education of any one of the universities of the association, as may be necessary to fulfill the pedagogical requirements prescribed by this board.

(b) To candidates who have received the bachelor's degree from a college requiring not less than 8 years of high-school and college training, and who submit evidence that in addition to the courses required for the bachelor's degree they have successfully completed at least one-half year of graduate study in a university belonging to the Association of American Universities; which half-year of graduate study shall consist of advanced academic study (part of the time, at least, being devoted to one or more of the subjects taught in the high school), and 6 months as student teachers in a well-equipped school of secondary grade directed by a California State Normal, or its recognized equivalent, under conditions conforming to the requirements prescribed by this board as the minimum amount of pedagogy.

(c) The minimum amount of pedagogy which section 1521, subdivision 2 (a) of the political code directs the State board of education to prescribe, is hereby declared to be as follows:

Satisfactory completion of courses, suitable and essential to acquiring efficient skill in teaching and an intelligent comprehension of the scope, and the attainable goals in high-school instruction; said courses to be equivalent to not less than 12 hours per week for one-half year; provided, that at least one-third of this work shall consist of practical teaching under the direction of supervising instructors of academic competency and breadth of pedagogic comprehension who for a period of not less than 2 years have taught the subjects in which they supervise.

PERSISTENCE OF CERTIFICATES.

Certificates are granted either for life or for a term of years. Whenever the term of years for which a certificate has been issued comes to an end, one of four things occurs: (1) The holder is not given another certificate; (2) the same kind of certificate is reissued to him after fulfillment of the same conditions upon which the original certificate was granted; (3) the same certificate is renewed or extended by fulfillment of other conditions; (4) the holder obtains a higher certificate through the fulfillment of additional conditions. In each of the last two cases the effect of the fulfillment of the requirements for the original certificate continues with full force in the granting of subsequent certificates. This continuance of the effect of fulfilling the requirements for, or the holding of, a certificate after the certificate itself has no longer any validity is called persistence. The term is also extended to cover the permanent continuance of the effect of meeting the requirements for a life certificate.

Obviously, persistence is absent in the first two cases mentioned above.

It exists in three forms:¹

(1) Through continuance of a life certificate.

¹ In the study of this subject it is assumed that the persistence of any certificate may be destroyed by the revocation of that certificate, or of a subsequent certificate; but no mention will be made of this possible limitation in the treatment of any phase of the question. For example, the so-called life or permanent certificates or that issued "during good behavior" are all treated alike as life certificates without reference to their possible revocation. The lapsing of a certificate through its holder failing to teach is, however, mentioned.

(2) Through renewal or extension of the same certificate.

(3) Through obtaining a higher certificate.

The third form in which persistency appears—the obtaining of a higher certificate—may be accomplished in a number of distinct ways. The following factors have been noted as entering into the determination: (1) Successful experience (this requirement is universal); (2) professional reading; (3) attendance at higher institutions of learning; (4) examination in additional subjects; (5) raising of standings in same subjects; (6) showing progressive efficiency in other ways.

Whether persistence is good or bad depends upon (1) the scholarship requirements for the certificate; (2) the amount of experience required for the certificate; (3) the form in which persistence appears; and (4) the requirements which must be met in order for persistence to operate. It should be so regulated as to promote progressive efficiency in all cases. That such is not always the case is apparent from that which follows, although no particular examples are cited. Because of the importance of the first two factors mentioned, it is desirable that the certificates be studied by classes, divided according to the educational accomplishments of the holders, the same method as that followed in studying scholarship and experience requirements. The tables previously given under that head contain the facts relating to persistence as well.

Certificates issued to college graduates (see Table 13).—Those States issuing certificates to college graduates grant, with few exceptions, a certificate for a limited number of years, upon the expiration of which a life certificate is issued. As a rule no experience is required for this certificate and no examination. The only condition which must be fulfilled in order to achieve the life certificate is the universal one of successful experience. The number of years required varies, as shown in the following table:

TABLE 29.—*Number of years experience required of college graduates under provisional and other certificates before a permanent life certificate is issued.*

Number of years experience.	Number of States requiring each number of years.
0.....	8
1.....	2
2.....	4
3.....	11
4.....	2
5.....	3
12.....	1
Total.....	31

The median number of years required is 3. As is seen in this table, 8 States admit college graduates to life certificates directly upon graduation, without test of their practical ability. In some

instances the list of institutions is restricted to a State university, as in Michigan, or to State institutions, as in Oklahoma.

Virginia and West Virginia do not grant life certificates. Virginia's highest certificate, requiring no specified amount of experience, is renewable for similar periods at the discretion of the board. The 12-year certificate of West Virginia is renewable, but 9 years experience is required for its issuance and 4 additional years for its renewal.

No State makes any other requirement than that of successful experience for the awarding of a life certificate to a graduate of a standard college holding a provisional certificate. Virginia is the only State that makes any other requirement for the renewal of any certificate issued primarily on the basis of college graduation, and in this case the colleges are not considered of standard grade. For its 5-year certificate it requires that the holder keep up his professional reading. North Carolina is the only State which will not renew a certificate based on graduation from a standard college.

*Certificates issued to State normal school graduates (see Table 15).—*There is a greater number of certificates based upon completion of normal-school courses and also a wider variety of practice as regards conditions upon which certificates are issued to those completing courses in normal schools, due to the differences in the courses offered in those institutions. There is usually at least one certificate in each State which may be obtained by normal-school graduates without experience, that one being granted to those completing the highest course. But there are not so many States which offer life certificates to graduates as in the case of colleges. Provisional certificates are issued, but they are not quite so prominent as are those for college graduates. The number of States requiring each of the various numbers of years of experience from normal-school graduates applying for life certificates is shown in the following table:

TABLE 30.—*Number of States requiring each of the various numbers of years of experience from normal-school graduates applying for life certificates.*

Number of years of experience required.	Number of States requiring.
0.....	4
1.....	7
2.....	5
3.....	4
4.....	0
5.....	6
6.....	1
10.....	1
Total.....	28

The median number of years is two, one year less than in the case of college graduates. Some Southern States issue to normal-school graduates certificates which are not included in this list by reason of lack of data.

Kansas is the only State that requires any condition other than successful experience as a prerequisite for awarding a life certificate to a holder of a short-term or provisional normal graduates' certificate. It requires an examination in professional branches. No doubt various degrees of discretion are exercised by the boards of other States in awarding this advancement in certificates, and doubtless they take into account other matters than that of mere experience. The exercise of their discretion is most marked probably in those States in which the laws make the plainest provision for it, as in California, North Dakota, Nevada, and Idaho. Among the conditions of renewal of certificates based upon shorter courses than those required for graduates are found the following: (1) Attendance at institutes—South Dakota; (2) reading circle courses must be maintained—Wyoming; (3) completion of additional year in normal school—Minnesota; (4) six weeks' attendance at a professional school—Wisconsin.

Certificates issued to high-school graduates (see Table 16).—Graduates from high schools, including a normal training course, are given, after a probationary period, a certificate which is renewable indefinitely in the States of Iowa, North Dakota, and Kansas. The same is true of the New York certificates that involve a year in the training class after the completion of the high-school course. New Hampshire issues a life certificate to high-school graduates making the required standings. Virginia, Oregon, and Utah make provision for the extension of this kind of certificate. The only State making any explicit condition upon which renewal is based is Kansas, which requires the holder to maintain progressive efficiency.

Lower grades of county certificates.—The following table shows for each State the provisions relating to renewal and reissuance of county certificates lower than first grade and their equivalents. The examination and experience requirements for these certificates are given in Table 17.

TABLE 31.—*Renewal and reissuance of certificates below first-grade county certificates and their equivalents. Complement of Tables 17 and 22. (Successful teaching is required for all renewals, whether mentioned or not.)*

States.	Renewal.	Reissuance.
North Atlantic Division:		
Maine.....	Renewed once.....	None.
New Hampshire.....	Nonrenewable.....	Do.
Vermont.....	Renewable.....	Do.
Rhode Island.....	Fourth renewable as evening school certificate only; third, 4 years, then 6.	Do.
Connecticut.....	Renewable.....	Do.
New York.....	Elementary extended 1 year for each 8 counts of academic work.	Do.
New Jersey.....	Build to higher certificate.....	Build to higher certificate.
Pennsylvania.....	Professional renewable 3 times, examined on 2 additional subjects.	May teach only 5 terms on a provisional certificate.
South Atlantic Division:		
Delaware.....	Nonrenewable.....	None.
Maryland.....	do.....	Do.
Virginia.....	Second grade, completion of prescribed reading.	Third grade, over to same person.
West Virginia.....	Nonrenewable.....	Not issued to same person for more than two years in succession.
North Carolina.....	do.....	None.
South Carolina.....	Third nonrenewable; second may, option of board, institute attendance.	Do.
Georgia.....	Nonrenewable.....	Do.
Florida.....	do.....	Do.
South Central Division:		
Kentucky.....	do.....	Third grade issued once only to same person.
Tennessee.....	Renewable, reading circle course.....	None.
Alabama.....	Nonrenewable.....	Do.
Mississippi.....	do.....	Do.
Louisiana.....	Extended 1 year for 9 weeks' attendance at normal schools.	Do.
Texas.....	May build to higher certificate.....	Do.
Arkansas.....	Second, 2 times; third, 1 time.....	Do.
Oklahoma.....	Second renewable, institute attendance, standing, and experience.	Third grade, not more than 2 to same person.
North Central Division:		
Ohio.....	At discretion of board.....	None.
Indiana.....	Nonrenewable.....	Do.
Illinois.....	Discretion of county superintendent.....	Do.
Michigan.....	Renewable if standing above 85 per cent in 2 examinations and continuous teaching.	Do.
Wisconsin.....	Second and third renewable, 6 weeks institutions, 2 credits, advance standings.	Third grade, not more than 3 to same person.
Minnesota.....	Second renewable under conditions prescribed by State superintendent.	Third grade, not more than 2 issued to same person in same county.
Iowa.....	Second, indefinitely; third, once; professional study for second.	None.
Missouri.....	Second renewable once only.....	Third reissued during period of four successive years.
North Dakota.....	Under rule prescribed by State superintendent.	None.
South Dakota.....	Nonrenewable.....	Do.
Nebraska.....	Second renewed if standing above a certain standard.	Third grade issued only once to same person.
Kansas.....	Holders second grade may build to higher grade.	Third grade reissued once if holder has taught 3 months.
Western Division:		
Montana.....	Second may be renewed.....	Third grade, not more than 2 to same person.
Wyoming.....	Second, completion of reading circle course.	None.
Colorado.....	Renewable once.....	Do.
New Mexico.....	Nonrenewable.....	Do.
Arizona.....	do.....	Do.
Utah.....	Renewable under regulations of State board.	Do.
Nevada.....	Nonrenewable.....	Third grade, only once to same person.
Idaho.....	Renewable 6 weeks' attendance professional school (2 credits).	None.
Washington.....	Second and third, attendance educational institutions.	Do.

Twelve States limit the number of times a third-grade certificate may be issued. Five of these States are in the North Central group, one in the North Atlantic, and two in each of the remaining divisions. Four States limit the number of third-grade certificates which the same person may hold to 1, four other States to 2, one State to 3, and one State to 4. Pennsylvania limits the number of terms which may be taught under a provisional certificate to 5, while West Virginia will not issue more than 2 third-grade certificates in succession to the same person.

No State limits the number of times that a second-grade certificate may be issued.

Thirteen States do not permit the renewal of either the second or third grade certificate, 13 permit the renewal of the third, but frequently a limit is placed upon the number of times. In five States successful experience appears to be a sufficient reason—Connecticut, Tennessee, Arkansas, Iowa, and Colorado. Louisiana, Wisconsin, Idaho, and Washington require study in professional schools. In North Dakota and Utah the matter is regulated by the State board and in Ohio by the local boards. In Michigan it depends upon the standing made in examinations.

The second-grade certificate, when there is such, is renewable except in the 13 States just referred to. These 13 States are New Hampshire, Delaware, Maryland, West Virginia, North Carolina, Georgia, Florida, Kentucky, Mississippi, Indiana, South Dakota, New Mexico, and Arizona. In many of these there is a strong tendency against the renewal of certificates and in favor of a reissuance after reexamination. Successful experience is the only ground specified in about eight of the States. Among additional prerequisites no one has prominence. Additional examinations are prescribed in 1, higher standings in 2, attendance in educational institutions in 4, institute attendance alone in 3, and combined with high standings in 1, discretion of officials in 2, meeting conditions prescribed in regulations in 3, and professional reading in 4.

Thus a teacher can continue teaching for life or the lowest grade certificate in all but 12 States and can continue teaching on the second or next to the lowest certificate in all the States. Thirteen States permit even the renewal of a third-grade certificate. All but 13 States grant renewals of the second-grade certificate, and apparently without limit, although many of the States make such requirements as are intended to bring about improvement in the teachers holding the certificate.

First-grade certificates (see Table 22).—First-grade certificates are renewable in all States but Delaware, Maryland, Georgia, Florida, and Tennessee. Whether the renewal is for stated periods or for life the effect is the same, as there is no limitation in any State except West

Virginia and Kentucky upon the number of times renewal may occur, provided the required conditions are met. For this reason the first-grade county certificate or its equivalent or, when there is not such, the certificate next above in rank, is the highest certificate that the majority of the teachers in the United States ever attain.

The conditions of renewal vary considerably, but most of them have as their object the furnishing of an incentive for the improvement of teachers in service. This incentive is most effective when conditions for renewal depend upon future acts rather than past accomplishments. For example, high standings in previous examinations do not give so strong a stimulus as the required completion of a course in professional reading.

The various conditions and the States in which they prevail are as follows:

1. Successful teaching only: West Virginia, Kentucky, Mississippi, Indiana, Wisconsin, Arizona—6. (In Indiana particularly and in Wisconsin the requirements for the original certificates are high, and so there is not so good a reason for additional requirements, although this does not entirely excuse their absence.)
2. Continuance in same position and 5 years' experience: Missouri—1.
3. Standings in 2 previous examinations: Michigan—1.
4. Discretion of county superintendent or board: North Carolina, Illinois, Ohio, California—4.
5. Meeting requirements prescribed by State superintendent or State board: North Dakota, Nebraska, New Mexico, Utah, Nevada—5.
6. Keeping up professional reading or reading-circle work: Virginia, Tennessee, Iowa, Missouri, Wyoming—5.
7. Attendance at institutes: South Carolina, Arkansas, South Dakota—3.
8. Attendance at institutes and standings previous examination—2.
9. Attendance at summer normals: Louisiana—1.
10. Attendance at summer normals and professional reading: Kansas—1.
11. Attendance at higher educational institutions one year: Wisconsin and Oregon—2.
12. Continuous teaching and satisfactory evidence of progress and efficiency: Montana—1.

Transfer of grades from lower to higher certificates.—In order to encourage the advancement of the professional ability of teachers holding county and equivalent licenses, a number of States have made provision for the transfer of grades from the lower to the higher certificates. This process is known in certain sections as "building up" or "building" from a lower to a higher certificate. A digest of the laws in accordance with which this is accomplished by holders of county certificates is as follows:

IDAHO.

The county superintendent may transfer the standings of a third-grade certificate in force to a second-grade certificate, and those of a second-grade to a first-grade, provided holder has had eight months successful experience in teaching and has attended a professional school for teachers at least six weeks and received credits in at least two subjects. Examination in additional subjects must be taken. (Act of 1911, H. B. No. 240, pp. 79-81.)

IOWA.

An applicant for life validation of a limited certificate is privileged to be reexamined at any regular examination in any branch or branches to raise his percentage to the required grade.

Holder of a second-grade certificate may build to a first-grade certificate by making the required grades, and by examination in the additional required branches, subject to the requirements of 36 weeks' experience. Likewise a holder of a third-grade certificate may build to a second or a first grade, applicant having the privilege of being examined in one or more of such branches at any regular examination. (State Department Circular No. 5, 1911.)

KANSAS.

Any person holding a second-grade certificate may retain for two years any grade of 90 per cent or more, secured at not to exceed four regular county teachers' examinations, and such grades shall be applied toward a first-grade certificate, but no grade received prior to the issuance of such second-grade certificate shall be so applied. (Act of Feb. 28, 1911, chap. 277, p. 506, Session Laws, 1911.)

MISSOURI.

A holder of a second or third-grade certificate "may raise the grade of his certificate by passing in the additional subjects required" provided the average for the higher certificate is obtained. (Same minimum standing for all certificates.) (School Laws, 1909, sec. 10942, p. 99.)

MONTANA.

A holder of a first, second, or third grade certificate who has taught one year or more in Montana upon making application for a certificate of higher grade is credited with the percentages of his last examination for the certificate which he holds, and is required to take examination in only those subjects in which his grades are not up to the required standard for the higher grade of certificate and in the additional branches required for such certificate. (Act of Mar. 3, 1905, School Laws, 1909, p. 136.)

NEVADA.

Any person who shall at any regular examination make a grade of 85 per cent or more in any subject shall receive credit for such subject toward a first-grade elementary certificate; provided that no such credit shall be held for a period of more than two years. (Act approved Mar. 20, 1911, Laws of Nevada, p. 192.)

NEW MEXICO.

"Standings of 90 per cent or more in subjects on an unexpired second-grade certificate may be accepted in granting a first-grade certificate." (Report of Superintendent of Public Instruction, 1908, pp. 26, 28.)

OREGON.

Any person receiving credits of 90 per cent or over in any subject or subjects at any regular teachers' examination in this State shall not be required to be reexamined in such subject or subjects in order to receive any certificate for which the applicant may be eligible to apply; provided, that credits so earned shall be forfeited if such person ceases to be actually engaged in educational work for three consecutive years. The holder of any common-school certificate shall be entitled to write on one or more subjects at any examination for the purpose of securing credits; and when sufficient credits have been earned the proper certificate shall be issued. (Acts of 1911, S. B. No. 101, p. 15.)

RHODE ISLAND.

Candidates for second-grade certificates who have held third-grade certificates or passed examinations for same will be examined in additional subjects only.

Candidates for first-grade certificates who have held a second-grade certificate or passed an examination for same will be examined in additional subjects. (Circular on examination and certification of teachers, June 30 and July 1, 1910.)

TEXAS.

Holder of a State second-grade certificate may build to either a State first-grade certificate or to a State permanent primary certificate, and the holder of a State first-grade certificate may build to a State permanent certificate or to a State permanent primary certificate, by taking examination in prescribed additional branches.

Likewise the holder of a State permanent primary certificate thus secured may build to a State permanent certificate during the first six years of the validity of said State permanent primary certificate.

A State certificate issued on work done in the University of Texas, a Texas State normal college, or any college or university of the first class, may be built upon through the regular examinations to a certificate of a higher grade.

In all cases of building from one certificate to another applicant shall have the privilege of being examined in one or more of the additional subjects at any examination. (Act of 1911, Bulletin No. 8, State Department.)

WASHINGTON.

Any person who receives credits of 90 per cent or over in any subject at any regular teachers' examination shall not be required to take an examination again in such subject, so long as he is actively engaged in educational work. The holder of any common-school certificate shall be entitled to write on one or more subjects at any examination for the purpose of securing credits; and when sufficient credits have been earned the proper certificate shall be issued. (School Laws, 1909, Par. 316, sec. 6, p. 85.)

WISCONSIN.

SEC. 450-452. County or city superintendent may transfer the standings of a third-grade certificate in force to a second-grade certificate if holder has taught successfully at least eight months and has attended a professional school for teachers for at least six weeks and received credits in at least two subjects.

SEC. 450-453. Contains same provision in relation to transfer from second to first-grade certificate.

The superintendent may allow any holder of an unexpired third-grade certificate or county training-school certificate to write on any two or more of the additional branches demanded for a second-grade certificate. If applicant secures the required standing in any two of said branches, the superintendent shall issue a new third-grade certificate based upon the previous examination or upon the county training-school certificate, good for one year; and if on expiration of such new third-grade certificate the applicant completes the second-grade examination, the superintendent may issue a second-grade certificate.

If at any time during the life of a second-grade certificate any applicant shall successfully write in the additional branches demanded for a first-grade certificate the superintendent may issue such first-grade certificate. (School Laws, 1909, p. 72, et seq.)

Of the 12 States in which "building up" is authorized by law for county certificates or their equivalents, all but Rhode Island and Texas are in the North Central and Western States. In 3 States—Rhode Island, Texas, and Missouri—no limitation is placed upon the grades that may be transferred. (In Missouri it is necessary that the average grade for the higher certificate be reached.) Two States do not permit the transfer of grades of teachers who have not taught 9 months—Iowa and Montana; while two others—Wisconsin and

Idaho—add the experience requirement of 8 months and 6 weeks attendance at professional schools. The limitations of other States have to do with the standings received in examinations. Three States permit the transfer of any grade of 90 per cent or more at any time—New Mexico, Washington, and Oregon—while in two States—Kansas and Nevada—it is further provided that only grades received within the preceding two years may be transferred. In Kansas the standing is fixed at 90 per cent; in Nevada at 85 per cent.

MINIMUM AGE REQUIREMENTS.

The most frequent minimum age requirement for the lowest grade of certificate is 18 years, 25 States having fixed this limit; 2 States require 16 years; 8 States, 17 years; and 1 State, 21 years; while 12 States have no fixed minimum age.

The following table gives the essential facts regarding this subject:

TABLE 32.—*Minimum age requirements.*

State and kinds of certificates.	Minimum age requirement.	Source of information.
Arizona: Any certificate.....	18 years.....	School laws 1907, p. 40.
Arkansas: Any certificate.....	None.....	Statement of State superintendent public instruction.
California: Any certificate.....	18 years.....	School laws 1909, p. 77.
Colorado: Any certificate.....	do.....	School laws 1909, p. 96.
Connecticut: Any certificate.....	None.....	Statement of secretary of State board of education.
Delaware: Any certificate.....	18 years.....	Regulation of State board of education. (Statement of secretary State board of education.)
Florida: Any certificate.....	17 years ¹	Statement of State superintendent of public instruction.
Georgia: Any certificate.....	None.....	Statement of State school commissioner.
Idaho: Any certificate.....	18 years.....	Acts of 1911, H. B. No. 240.
Illinois: Any certificate.....	18 years, male..... 17 years, female.....	} School law 1909, p. 48.
Indiana: Any certificate.....	None.....	
Iowa: Any certificate.....	18 years.....	Regulation of State board of examinations. (Statement of State superintendent.)
Kansas: First-grade certificate..... Second-grade certificate..... Third-grade certificate..... Temporary certificate.....	20 years..... 18 years..... do..... do.....	} Session laws 1911, p. 506.
Kentucky: State diploma..... State certificate..... County certificate.....	24 years..... 21 years..... 18 years.....	
Louisiana: Any certificate.....	do.....	Public school law 1911, p. 147. (Regulation of State board of education.)
Maine: Any certificate.....	None.....	Statement of State superintendent of public schools.
Maryland: Any certificate.....	19 years, male..... 18 years, female.....	} Public school law 1908, p. 40.
Massachusetts: Any certificate.....	None.....	
		Statement of State commissioner of education.

TABLE 32.—*Minimum age requirements—Continued.*

State and kinds of certificates.	Minimum age requirement.	Source of information.
Michigan: Any certificate	18 years	General school laws 1909, p. 79.
Minnesota: First-grade certificate	do	Circular of information 1908.
Second-grade certificate	do	School laws 1907, pp. 116-117.
Limited second-grade certificate	17 years	
Mississippi: Any certificate	do	School laws 1910, p. 35.
Missouri: Any certificate	None	Statement of State superintendent of public schools.
Montana: Any certificate	18 years	School laws 1909, p. 113.
Nebraska: Any certificate	None	Statement of examiner, State of Nebraska.
Nevada: High-school certificate	20 years	School laws 1909, p. 113.
First-grade elementary certificate	do	
Any other certificate	18 years	Act of 1911. (Statement of State superintendent.)
New Hampshire: Any certificate	None	Statement of State superintendent of public instruction.
New Jersey: Supervisor's certificate	25 years	Regulations of State board of education.
Any other certificate	18 years	
New Mexico: Any certificate	17 years ¹	Regulation of Territorial board of education. (Statement of Territorial superintendent of public instruction.)
New York: Any certificate	18 years	Education law 1909, p. 131.
North Carolina: Any certificate	do	School law 1909, p. 69.
North Dakota: Any professional certificate	20 years	Acts of 1911, Senate bill No. 60.
First-grade elementary certificate	do	
Second-grade elementary certificate	18 years	
Ohio: Any certificate	do	Session laws 1908, p. 351.
Oklahoma: First-grade certificate	20 years	School laws 1910, pp. 66-67.
Second-grade certificate	18 years	
Third-grade certificate	16 years	
Oregon: Any certificate	18 years	Acts of 1911, S. B. No. 101.
Pennsylvania: State teachers' permanent certificate	21 years	School laws 1909, pp. 137, 154.
Practical teachers' State certificate (not a regular student or graduate of a normal school)	do	
Rhode Island: Any certificate	None	Statement of commissioner of public schools.
South Carolina: Any certificate	18 years	School laws 1909, p. 60.
South Dakota: Any certificate	do	School law 1909, p. 16.
Tennessee: Any certificate	do	Regulation of the State superintendent of public instruction.
Texas: Any certificate	16 years	Bulletin 8, State department of education.
Utah: State diploma	20 years	School law 1909, pp. 3-4, 17.
State certificate	20 years	
Any county certificate	18 years	
Vermont: Any certificate	17 years	General laws of the State of Vermont relating to public instruction, 1907, p. 267.
Virginia: First-grade certificate	19 years	Public free school law 1907, pp. 124, 125. (Regulations of State board of education.)
Second-grade certificate	18 years	
Third-grade certificate	do	
Washington: Temporary certificate	do	Code of public instruction, 1909, p. 85.
Second-grade certificate	do	
Third-grade certificate	do	
Any certificate other than above	19 years	

¹ A general rule which may be waived in some instances.

TABLE 32.—*Minimum age requirements*—Continued.

State and kinds of certificates.	Minimum age requirement.	Source of information.
West Virginia: Any certificate.....	17 years.....	School law 1908, p. 43.
Wisconsin: Any certificate.....	None.....	School laws 1909, p. 99. (Comments by State superintendent.)
Wyoming: Any certificate.....	17 years.....	School laws 1909, p. 125.

FEES.

The following table dealing with fees charged for teachers' certificates is included as a matter of practical interest in the administration of systems of certification. Generally, higher fees are charged for the more advanced certificates. The amounts vary greatly among the various States, ranging from \$10 to 50 cents. Some States charge no fees. There is great variety also in the use that is made of the fees collected. Most frequently they go toward the payment of the expenses of conducting the examinations and the maintenance of institutes.

TABLE 33.—*Fees required for teachers' certificates and funds to which they are credited.*

Names or kinds of certificates.	Amount of fees.	Funds to which credited.
Alabama (public school laws, 1908, pp. 23-24): Life certificate.....	\$3.....	Paid into State treasury to the credit of educational fund.
First-grade certificate.....	\$2.....	Do.
Second-grade certificate.....	\$1.50.....	Do.
Third-grade certificate.....	\$1.....	Do.
Temporary certificate.....	No fee.....	Do.
Any certificate issued upon special examination.	\$5.....	Paid to State board of examiners.
Arizona (school laws, 1907, pp. 9-14): Life diploma.....	\$7.....	\$2 paid into county treasury to the credit of institute fund; \$5 defrays expenses of issuing.
Educational diploma.....	\$5.....	Defrays expenses of issuing.
First-grade certificate issued without examination.	\$2.....	Territorial school fund.
Any other certificate.....	do.....	County institute fund.
Arkansas (school laws, 1910, pp. 15, 37): State certificate.....	\$10.....	Paid into State treasury to defray expenses of examination, the remainder constituting an institute fund and a library fund for the office of the department of public instruction.
Professional license.....	\$5.....	Do.
Any county certificate.....	\$2.....	County superintendent's fund for payment of salary.
California (school law, 1909, pp. 13-29): Life diploma.....	\$2.....	Defrays expense of issuing.
Temporary certificate.....	No fee.....	
Any county certificate.....	\$2.....	Paid into county treasury; one-half is credited to the teachers' institute fund; one-half to the teachers' library fund.
Colorado (school laws, 1909, p. 97): State diploma.....		
Any county certificate.....	\$1.....	State normal institute fund.
Temporary certificate.....		
School-district certificate.....		
Connecticut.....		
Delaware.....		

TABLE 33.—*Fees required for teachers' certificates and funds to which they are credited—Continued.*

Names or kinds of certificates.	Amount of fees.	Funds to which credited.
Florida (school laws, 1909, p. 28):		
Any certificate.....	\$1.....	County school fund.
Georgia.....		
Idaho (acts of 1911, H. B. 240, Art. X, secs. 96 and 100):		
Life certificate.....	\$10.....	State board of education fund.
State certificate.....	\$5.....	Do.
First-grade county certificate.....	\$4.....	\$3 to State board of education fund; \$1 to county institute fund.
Second-grade county certificate.....	\$3.....	\$2 to State board of education fund; \$1 to county institute fund.
Third-grade county certificate.....	\$2.....	\$1 to State board of education fund; \$1 to county institute fund.
Illinois (school laws, 1909, pp. 38, 48, 49):		
Any State certificate.....	\$1 annual registration fee.....	County institute fund.
Any county certificate.....	\$1.....	Do.
City certificate.....	No fee.....	
Indiana (school laws, 1907, pp. 20, 21, 83):		
Life State license.....	\$5.....	
Professional license.....	No fee.....	
All State licenses other than above.....	\$1.....	Defrays expenses of examination.
Iowa (school laws, 1907, pp. 9-10, 16-20):		
State diploma.....	\$5.....	Paid into State treasury.
Any State certificate.....	\$2.....	Do.
Any certificate validated for life.....	\$5.....	Do.
Any county certificate.....	\$1.....	One-half paid into State treasury; one-half credited to county institute fund.
All certificates.....	\$1 annual registration fee.....	County institute fund.
Kansas (school laws, 1909, pp. 28-29):		
Any county certificate (upon examination held at a State educational institution).....	\$1.....	Do.
Any county certificate (upon examination before county examining board).....	\$2.....	\$1 to credit of county institute fund.
Kentucky (school laws, 1910, pp. 29-33):		
State diploma.....	\$5.....	Paid to the two members of State board of examiners appointed by the State superintendent.
State certificate.....	\$4 (besides registration fee for forwarding answers to examination questions to State board of examiners).....	\$1 paid to the county board of examiners; \$3 divided between the two professional members of the State board of examiners.
Any county certificate.....	\$1.....	Divided between the two members of county board of examiners appointed by county superintendent.
Louisiana (school laws, 1908, p. 65):		
Any parish certificate.....	\$1.....	Paid to State superintendent to credit of institute fund
Maine.....		
Maryland (school laws, 1910, p. 32).	No fee.....	
Massachusetts.....		
Michigan (school laws, 1909 pp. 116-117):		
Any certificate.....	\$1 to male applicant and an annual fee of \$1; 50 cents to female applicant and an annual fee of 50 cents.	Teachers' institute fund.
Minnesota.....		
Mississippi (school laws, 1906 pp. 25, 27, 41):		
Professional license.....	\$5.....	To State board of examiners for their services.
State license.....	50 cents.....	
Transfer license.....	\$1.50.....	To county superintendent for his services. Institute fund.
Special license.....	\$2.50.....	
Any county license.....	50 cents on application for license and 50 cents additional for each year's duration of any license for more than one year.	

TABLE 33.—*Fees required for teachers' certificates and funds to which they are credited—Continued.*

Names or kinds of certificates.	Amount of fees.	Funds to which credited.
Missouri (school laws, 1909, pp. 89, 98):		
Any State certificate.....	No fee.....	Paid to county treasurer to defray expenses of examination and teachers' associations and meetings.
Any county certificate.....	\$3 to white applicants; \$1.50 to colored applicants who present certificates of attendance at a colored institute.	
Montana (school laws, 1909, pp. 16, 137):		
Temporary State certificate.....	\$1.....	Institute fund of county in which holder is employed.
Any county certificate.....	do.....	County institute fund.
Nebraska (school laws, 1909, pp. 78, 102):		
Professional State certificate.....	\$1.....	Paid to State superintendent to defray expenses of issuing.
Any county certificate.....	\$1.50.....	\$1 to teachers' institute fund, 50 cents paid to State superintendent to defray expenses of issuing.
City certificate.....	\$1.....	City institute or union institute fund.
Nevada.....		
New Hampshire.....		
New Jersey.....		
New Mexico (Department of Education, Circular Letter No. 12):		
Professional certificates—		
Life certificate.....	\$10.....	
3-year and 5-year certificates.....	\$3.....	
New York.....		
North Carolina (school law, 1909, p. 67):		
Any certificate issued upon private examination.....	\$3.....	County school fund.
North Dakota (acts of 1911, senate bill 60):		
First-grade professional.....	\$5.....	Deposited by State board of examiners in State treasury to aid in the establishment of teachers' reading circles and in the professionalizing of teaching in the State and in defraying expenses of the board.
Second-grade professional or a special certificate.....	\$3.....	Do.
Elementary certificates.....	\$2.....	\$1 to county teachers' institute fund; \$1 to State board of examiners.
Ohio (school laws, 1910, pp. 134, 146):		
Any life certificate.....	\$5.....	Paid to State treasurer.
Any State professional certificate.....	\$1.50.....	\$1 to State general-revenue fund; 50 cents to county institute fund.
Any county or city certificate.....	50 cents.....	County or city institute fund.
Oklahoma (school laws, 1910, pp. 58, 67. Department of Education Report, 1908, pp. 135, 138):		
Any State certificate except an elementary State certificate.....	\$3.....	
Elementary State certificate.....	\$2.....	Sent to county superintendent of county where applicant resides.
County certificates of first, second, and third grades.....	do.....	Normal institute fund.
County temporary certificate.....	No fee compulsory, but not to exceed \$2.	
Institute conductor's certificate.....	\$2.....	
Institute instructor's certificate.....	\$1.....	
Any county certificate.....	\$2 (indorsement fee in a county other than that in which issued).	
Oregon (acts of 1911, S. B. No. 101):		
Life State certificate.....	\$6.....	State board of examiners' fund.
Five-year State certificates or renewal.....	\$4.....	Do.
Primary 5-year State certificates or renewal.....	do.....	Do.
One-year State certificates or renewal.....	\$2.....	Do.
Special certificates.....	\$6.....	Do.

TABLE 33.—*Fees required for teachers' certificates and funds to which they are credited—Continued.*

Names or kinds of certificates.	Amount of fees.	Funds to which credited.
Oregon—Continued.		
Temporary county certificate.	\$2.50.....	State board of examiners fund
Special district certificate.	Option of authority issuing..	
Pennsylvania.....		
Rhode Island.....		
South Carolina.....		
South Dakota (school laws, 1909, pp. 6-16. H. B. No. 396, legislature 1911):		
Life diplomas—		
Upon examination.....	\$10.....	State professional fund.
Upon diploma.....	No fee.....	
State certificates—		
Upon examination.....	\$5.....	Do.
Upon diploma.....	No fee.....	
Provisional State certificate.	\$2.....	Do.
First, second, and third grade certificates, and primary certificates.	\$1.....	50 cents to credit of institute fund; 50 cents to credit of general fund of the State.
Tennessee.....		
Texas (Bulletin No. 8, State Department of Education, Apr. 1, 1911):		
First-grade State, second-grade State, or permanent State certificates.	\$2.....	\$1 to county board of examiners; \$1 to State board of examiners.
State permanent certificate based on diploma or work done in a college or university, or life certificate of another State.	do.....	State board of examiners.
Any county certificate.....	do.....	County board of examiners.
Utah.....		
Vermont.....		
Virginia.....		
Washington (Code of Public Instruction, 1909, pp. 84-91):		
Any certificate.....	\$1.....	County or city institute fund.
West Virginia (act of 1911, statement of state department; School Laws, 1908, p. 59):		
State professional certificate.	\$5.....	Expense of examination.
Any certificate granted under uniform examination system.	\$1.50 (on entire examination). 75 cents (on partial examination).	State general school fund.
Emergency certificate.....	\$1.50.....	Do.
Wisconsin (School Laws, 1909, p. 81):		
Any certificate.....	No fee.....	
Wyoming (School Laws, 1909, pp. 128-129):		
First-class and professional certificates.	\$1.50.....	State general fund.
Second and third class certificates and special certificates.	\$1.....	Do.
Temporary certificate.....	50 cents.....	Do.

SUSPENSION AND REVOCATION OF CERTIFICATES.

The grounds upon which certificates may be suspended or revoked are much the same among all the States; immoral or unprofessional conduct, unfitness for teaching, refusal to comply with law or regulations or with directions of officers constitute the most prominent grounds. The rights of the teacher against whom charges are brought are well protected in most States; a fair hearing and, frequently, the right of appeal being specifically provided for. The officer or officers issuing the certificates and their superior officers make the decisions. The following table presents the essential facts regarding the subject.

TABLE 34.—*Suspension and revocation of certificates.*

Names or kinds of certificates.	Officer empowered to suspend or revoke.	Grounds upon which suspension or revocation may be made.	Process.
Alabama (School laws, 1908, p. 27): Life certificate.....			
Any certificate.....			
Arizona (School laws, 1907, pp. 8-10): Any diploma.....	Superintendent of education.	Leaving off the business of teaching for 5 consecutive years.	
Any certificate.....	Ter. board of education.	Immoral conduct or unbecoming or indecent behavior.....	
Arkansas (School laws, 1910, pp. 39, 75): Any certificate.....	Ter. board of examiners	do.....	
	County superintendent.....	Immoral character or insufficient learning and ability for a competent teacher. Failure to attend one institute annually without a reasonable excuse renders certificate revocable.	Notice immediately given to such teacher and the directors, thereby terminating the contract between said parties.
California (School laws, 1909, pp. 13, 119): Life diplomas.....	State board of education....	Immoral or unprofessional conduct, or evident unfitness for teaching.	
Any county certificate....	County board of education..	Immoral or unprofessional conduct, evident unfitness for teaching, or persistent defiance of and refusal to obey the laws regulating the duties of teachers.	State board of education adopts such rules for said revocation as it may deem expedient or necessary. A hearing before the county board of education, and upon the affirmative vote of at least 4 members of the board. All charges to be presented to the board in writing and verified under oath. Notice of the time of hearing and a full and complete copy of the charges to be furnished to the accused at least 10 days before the hearing. The accused to be given a fair and impartial hearing and to have the right to be represented by counsel. The hearing to be governed by and conducted under the rules of the board.
City, or city and county certificates.	City, or city and county board of education.	Immoral or unprofessional conduct, profanity, intemperance, or evident unfitness for teaching.	
Colorado (school laws, 1909, pp. 36, 97): State diploma.....	State board of education....	Satisfactory evidence that the holder thereof has become unworthy of the same.	Before revocation the holder of such diploma shall have at least 30 days' notice to appear before the State board and refute any charges brought against him.
Any county certificate....	County superintendent.....	Immorality, incompetency, or other just cause.....	The right of appeal to the State board of education shall not be denied the teacher, if said appeal be taken within 30 days from date of notice of such revocation.
School district certificates. (Districts of first class.)	School board of district.....	do.....	Do.

Connecticut (laws relating to schools, 1909, secs. 67, 210, 211): Any State certificate..... Local high-school certificates. Local public-school certificate. Delaware (school laws, 1908-9, pp. 10, 37, 40): Any certificate.....	State board of education..... Board of school visitors or high school committee. School visitors, school committee, board of education. County school commission.....	Incompetence to teach or to manage a school, or failure to conform to the requirements. .....do..... (1) Refusal to comply with the reasonable directions given by the county superintendent; (2) Failure of the teacher to make the required complete and correct annual report to the State board.	Right of appeal to the State board of education.
Florida (school laws, 1909, pp. 24, 32): Any certificate.....	Authority issuing or endorsing same, or State superintendent. State school commissioner..... County commissioner.....	Unsuccess, incompetence, immorality, or failure to be governed by the rules and regulations of the department of public instruction. Good and sufficient cause..... Incompetency, immorality, cruelty to pupils, or neglect of duty.	Notice in writing shall be given to the authority issuing said certificate, giving grounds for suspension. In either revocation or suspension the teacher shall be notified in like manner, and also of the right of appeal, and to whom and when the appeal should be made.
Georgia (laws and decisions of common school systems, p. 40): Permanent license..... Any county certificate.....	State school commissioner..... County commissioner.....	Any disqualification which would have been sufficient ground for refusing to issue the same, had the cause existed or been known at the time of its issue. Neglect of duty, incompetency to instruct and govern a school, immorality, or any cause or disqualification which would have been sufficient ground for refusing to issue the same, had the cause existed or been known at the time of issue.	Right of appeal to county board of education, whose decision shall be final.
Idaho (act of 1911, H. B. No. 240): Life diploma or State certificate. Any county certificate.....	State board of education..... County superintendent.....	Any disqualification which would have been sufficient ground for refusing to issue the same, had the cause existed or been known at the time of its issue. Neglect of duty, incompetency to instruct and govern a school, immorality, or any cause or disqualification which would have been sufficient ground for refusing to issue the same, had the cause existed or been known at the time of issue.	The holder shall have at least 30 days' notice to appear before the State board and show cause why such revocation should not be made. No certificate shall be revoked or annulled without a personal hearing, unless the holder thereof shall, after 30 days' notice, neglect or refuse to appear before the superintendent for that purpose.
Illinois (school law, 1909, pp. 4, 9): Any State certificate..... Any county certificate..... Indiana (school laws, 1907, pp. 20, 78): Life State license..... Any license issued by county superintendent or by State superintendent.	State superintendent..... County superintendent..... State board of education..... County superintendent.....	Immorality or other unprofessional conduct. Immorality, incompetency, or other just cause..... Incompetency, immorality, cruelty, or general neglect of the business of the school.	Due notice of such revocation shall be given in writing by the county superintendent and an appeal therefrom shall lie to the State superintendent of public instruction, and if the same be taken within 5 days after notice is given, it shall operate as a stay of proceedings until the State superintendent shall have passed upon such appeal.

TABLE 34.—*Suspension and revocation of certificates—Continued.*

Names or kinds of certificates.	Officer empowered to suspend or revoke.	Grounds upon which suspension or revocation may be made.	Process.
Iowa (school laws, 1907, p. 18): Any certificate or diploma.	County superintendent.....	Incompetency, immorality, intemperance, cruelty, or general neglect of the business of the school.	The county superintendent shall within 10 days after charges are preferred transmit to such teacher a written statement of said charges, and set the time and place for the hearing of the same, at which trial the teacher shall be privileged to be present and make defense. The county superintendent shall issue in duplicate an order revoking the certificate or diploma, the same becoming operative and of full force and effect 10 days after the date of its issue, one copy of the order to be mailed to the holder of the certificate and the other to be mailed to the State superintendent. The person aggrieved has the right to appeal to the State superintendent within 10 days from the date of such mailing, the revocation in such case not being effective until affirmed by the State superintendent after full hearing. The revocation of all State certificates and life diplomas must be affirmed by the educational board of examiners after full review before becoming effective.
Life certificates. Kansas (school laws, 1909, pp. 21, 33): Any certificate.....	By authority issuing.....	Certificate shall lapse provided holder does not teach during a period of 5 successive years.	
Life certificates.		Immorality, gross neglect of duty, annulling written contracts with boards of education and district boards without the consent of a majority of the board which is a party to the contract, or any cause that would have justified the withholding thereof when the same was granted. Void if the holder should not be engaged in school work for 3 consecutive years, subject to renewal by State board of education.	
Kentucky (common school laws, 1910, pp. 30-32, 107, 124, 185): University diploma (B. A. in Education), or any university or normal school certificate.	Board of trustees of university, board of regents of normal schools, or the State superintendent of public instruction. (Any county superintendent may revoke for his county.) Superintendent of public instruction, or by county superintendent as far as it	(1) For cause; (2) failure to attend county institute without legal excuse renders certificate forfeitable. (1) For cause; (2) failure to attend county institute without legal excuse, or failure to engage in active school work two successive years forfeits the certificate.	
State diploma.....			In case of revocation by a county superintendent immediate notice shall be given to the State superintendent of public instruction, and he shall have power to approve or reverse such revocation. Before a certificate is revoked for failure to attend institute the teacher must be given notice to appear and show cause, if he can, why the certificate should not be revoked. In case of revocation by county superintendent immediate notice shall be given to the State superintendent. Before a certificate is revoked for failure to attend institute

State certificate.....	applies to his own county subject to the approval of State board of education. Superintendent of public instruction, or by county superintendent as far as it applies to his county, subject to the approval of State superintendent.	County superintendent.....	Incompetency, inefficiency, immorality, or qualities unworthy a teacher, or failure to attend county institute without legal excuse.	A hearing is given the teacher in case of failure to attend institute without legal excuse.
Any county certificate.....	City board of education.....	City board of education.....	Any cause deemed sufficient by city board. Failure to receive regular employment of the board within 5 years from date of certificate forfeits the certificate.	
Louisiana (school laws, 1908, pp. 41-42, 65): Parish superintendent's certificate. Any parish certificate.....	State board of education..... Parish superintendent.....	State board of education..... Parish superintendent.....	Incompetency, inefficiency, or unworthiness..... do.....	Subject to approval or disapproval of parish board of education.
Maine..... Maryland (public school laws, 1910, pp. 10, 26): Life certificate..... County superintendent's certificate. Any certificate.....	State board of education..... State board of education..... State superintendent. Board of county school commissioners.	State board of education..... State board of education..... State superintendent. Board of county school commissioners.	Immoral or unprofessional conduct..... Moral delinquency, inefficiency, or incompetency for discharge of duties. Immorality.....	Subject to approval of State board of education. Teacher given reasonable notice of the charge in writing and an opportunity to defend himself. If charge is sustained, notice is given to the State board of education. An appeal shall lie to the State board of education, whose decisions shall be final.
Massachusetts..... Michigan (school laws, 1909, pp. 74-76, 81-83, 138): University of Michigan certificate.	Annulled only by board of regents; may be suspended by the legal examining officer or officers in any county, township, city, or district as far as it affects said county, township, city, or district. State board of education..... do..... do.....	Annulled only by board of regents; may be suspended by the legal examining officer or officers in any county, township, city, or district as far as it affects said county, township, city, or district. State board of education..... do..... do.....	For cause..... do..... do.....	A personal hearing shall be granted.
State life certificate. College certificate. Advanced State Normal College, Central Normal, Northern Normal, or Western Normal certificates. Certificate of teacher of agriculture.	State board of agriculture.....	State board of agriculture.....	Any cause which would have justified the board in withholding said certificate.	

why, the teacher must be given a chance to show cause why the certificate should not be revoked.

TABLE 34.—*Suspension and revocation of certificates—Continued.*

Names or kinds of certificates.	Officer empowered to suspend or revoke.	Grounds upon which suspension or revocation may be made.	Process.
Michigan—Continued. Any county certificate.....	County board of examiners.....	Neglect of duty, incompetency, immorality, or any other reason which would have justified said board in withholding the same when given.	Written charges shall be filed with the county commissioner, who shall immediately notify the accused of said charges, sending him a copy of the same, together with the names of the person or persons filing the charges. The commissioner may, and on written demand of the accused shall, within 20 days after the filing of said charges, call a meeting of the board of examiners of the county, and shall summon the accused and also any witnesses to appear before said board on the date mentioned in the summons. No certificate shall be suspended or revoked without a personal hearing unless the holder thereof shall, after a reasonable notice, neglect or refuse to appear before said board. Any person refusing to appear before said board on the day mentioned in the summons shall be deemed guilty of a misdemeanor, and upon conviction in any court of competent jurisdiction shall be subject to fine or imprisonment, or both.
Any certificate.....	County commissioner.....	Willful neglect of duty, incompetency to instruct or govern a school, or gross immorality, known to the commissioner through personal investigation or knowledge.	A temporary suspension of certificate. The county commissioner shall call a meeting of the board of examiners within 10 days after suspension, summoning the teacher to appear before said board for a hearing. The board shall file its decision in the office of county commissioner within 10 days after the close of the hearing, and the county commissioner within 5 days after the filing of said decision shall mail a copy thereof to said teacher; any teacher may appeal within 20 days after the filing of said decision to the probate court of said county, who shall hear and determine said cause.
Minnesota (laws, 1911, chap. 96): Any certificate.....	County superintendent may suspend. State superintendent may suspend or revoke.	(a) Immoral character; (b) conduct unbecoming a teacher; (c) failure, without justifiable excuse, to teach for the term of his contract without first securing the written release of the school board; (d) inefficiency in teaching or in management of school; (e) affliction with active tuberculosis or some communicable disease is cause for suspension while holder is suffering from such disability.	County superintendent or any school board may begin action. County superintendent must serve notice upon teacher and grant him opportunity to make defense. Teacher may appeal within 10 days after receipt of notice of suspension by county superintendent to State superintendent, who may confirm, modify, or reverse such suspension, extend it to cover all counties, or may revoke the certificate. If county superintendent refuses to suspend upon complaint of board of education, the board may appeal to the State superintendent, who, after giving teacher opportunity for defense, takes such of above actions as he deems best.

Mississippi (school laws, 1906, pp. 10, 26): State license..... Any license.....	State board of examiners..... County superintendent.....	Good cause, or leaving off the business of teaching. Intemperance, immorality, brutal treatment of a pupil, or other good cause.	An appeal lies to the State board of education. The county superintendent shall notify the teacher of the charges 10 days before the trial.
Missouri (school laws, 1909, pp. 89, 100, 115): Any State certificate.....	State superintendent or county superintendent.	Incompetency, cruelty, immorality, drunkenness, or neglect of duty. do.....	The county superintendent in the county where the offense is alleged to have been committed shall notify, in writing, the person or board issuing said certificate; such person or board shall proceed as provided for revocation by a county superintendent. Do.
University or normal diploma or certificate. Any county certificate.....	State superintendent, board of curators of university, board of regents of normal school, or county superintendent. County superintendent.....	Incompetency, immorality, neglect of duty, or the annulling of written contracts with boards of directors without the consent of the majority of the members of the board which is a party to the contract.	All charges must be preferred in writing and signed by the party or parties filing the accusation, and the teacher must be given due notice and opportunity to be heard.
Montana (school laws, 1909, pp. 16-19, 114, 131, 137): Any State or life diploma.	State superintendent.....	Incompetency, immoral conduct, or any cause which would have justified the State board in refusing to grant such diploma.	Before revocation the holder shall be served with a written statement of the charges against him, and shall have an opportunity of defense before said State board of education.
Do.....	State board of education.....	Leaving the school before the expiration of time specified in the contract without the written consent of the trustees constitutes sufficient cause for the suspension of such diplomas for the period of 1 year.	
Any county certificate.....	County superintendent.....	(1) Incompetency, immorality, intemperance, cruelty, crime against the State law, refusal to perform duty, general neglect of the business of the school, or willful failure to attend institute; (2) leaving the school before the expiration of the time specified in the contract without the written consent of the trustees constitutes sufficient cause for the suspension of such certificates for the period of 6 months.	
Nebraska (school laws, 1909, pp. 77, 80): Any certificate.....	Authority issuing the same.....	Incompetency, immorality, intemperance, cruelty, crime against the law of the State, negligence of duty, or general negligence of the business of the school, nonattendance at institute without satisfactory reasons in writing, and any cause which would justify the refusal to grant such certificate.	The teacher shall be given opportunity to explain his conduct, and a certificate shall be revoked only after a full hearing of the evidence for and against such action.

TABLE 34.—*Suspension and revocation of certificates—Continued.*

Names or kinds of certificates.	Officer empowered to suspend or revoke.	Grounds upon which suspension or revocation may be made.	Process.
Nevada (laws 1911, pp. 183-189): Any certificate.....	State board of education may revoke or suspend; deputy superintendent of public instruction may revoke.	May be revoked for incompetency, insubordination, or immorality. May be suspended for failure to attend county or district institutes and for breaking a contract to teach.	
New Hampshire. New Jersey (school laws, 1908, pp. 48, 66, 150): Any certificate.....	State board of examiners.....	(1) Good cause; (2) being agent for or in any way pecuniarily or beneficially interested in the sale of any text books, or other school supplies of any kind, or unlawfully promoting or favoring the same. Leaving school before the expiration of the term of employment without the consent of the board of education renders certificate liable to suspension for a period not exceeding one year.	Subject to appeal to State board of education.
Do.....	State superintendent.....		Do. Do.
Any county certificate. Any city certificate..... New Mexico (school laws, 1909, p. 205): Any certificate.....	County board of examiners. City board of examiners. Territorial board of education.	Incompetency, immorality, or any cause that should have withheld the issue of such certificate.	A full and fair hearing, with privilege of counsel.
New York (education law, 1910, secs. 94, 556, 562, 691, 773): Any certificate.....	Commissioner of education.....	Refusal to conform to the requirements of the school laws, or any sufficient cause. (1) Immorality.....	Commissioner of education may reconsider and reverse his action. Teacher must be given reasonable notice of the charge, and an opportunity to defend himself. If the certificate thus annulled was granted by the commissioner of education, or a former superintendent of public instruction, or is a diploma of State normal school, notice of such annulment must be sent forthwith to the commissioner of education.
Do.....	School commissioner.....	(2) Failure to fulfill an agreement to teach a term of school, without good reason. (3) Willful failure to attend teachers' institute.....	
North Carolina (school law, 1909, p. 72): Any certificate.....		(1) Failure to attend continuously the biennial institute and school debar from teaching for a period of one year, or until such teacher shall have attended, according to	

North Dakota (acts of 1911, Senate bill 60): Any certificate.....	State board of examiners.....	law, some county institute and school, or presents certificate of continuous attendance at some summer school of good standing for a period of not less than three weeks. (2) Any teacher may be suspended by the county superintendent if guilty of immoral or disreputable conduct, incompetent to discharge efficiently the duties of a public school-teacher, or persistent neglect of such duties.	Concurrence of the majority of the school committee essential.
Ohio (school laws, 1910, pp. 107, 134, 137, 143): Any State life certificate. Any county certificate.....	State board of examiners. County board of examiners.....	Any cause which would have been sufficient grounds for refusal to issue the same; and willful violation of teacher's contract, incompetency, immorality, intemperance, cruelty, crime against law of State, and refusal to perform duty.	Immediate action is had by the board when said board has personal knowledge of the cause, but an opportunity must be given the accused for personal explanation. If board acts on evidence obtained from others, there shall be a fair hearing after teacher has been notified and given every opportunity for defense. Upon revocation, the State board shall notify immediately the clerk of the school district where said teacher is employed, shall notify said teacher through the clerk, and shall also notify each county superintendent in the State, and enter its action on its records. If said teacher refuses to surrender his certificate, said board may publish notice of such revocation in a newspaper printed in the county where accused was last employed.
Any city certificate. Any superintendent's, supervisor's, or principal's certificate.	City board of examiners.....	do. Forfeited by acting as sales agent, either directly or indirectly, for any person, firm, or corporation whose school textbooks are filed with the State commissioner for use in the public schools.	Before any hearing is had by a board of examiners the accused shall be notified in writing as to the nature of the charges, and the time set for the hearing, such notice to be served personally or at his residence; and he shall be entitled to produce witness and defend himself.
Oklahoma, (common-school laws, 1910, pp. 62, 67, 75): University diploma certificate. C. A. and N. University, normal department diploma certificate. Any county certificate.....	State superintendent..... County board of examiners.....	Proper and sufficient cause..... Immorality or any other cause that would have justified the withholding thereof. Allowing mixed attendance of the races cancels the certificate for the period of 1 year.	do.

TABLE 34.—*Suspension and revocation of certificates—Continued.*

Names or kinds of certificates.	Officer empowered to suspend or revoke.	Grounds upon which suspension or revocation may be made.	Process.
Oregon (acts of 1911, S. B. No. 10): Any certificate.	Authority issuing.	Immorality, intemperance, crime against the law of the State, or gross neglect of duty.	Revocation may take place upon the written complaint of any county superintendent, after the defendant has been given an opportunity to be heard. The holder shall not be eligible to receive another teacher's certificate within 12 months after date of revocation. The aggrieved shall have right of appeal to State superintendent when certificate is revoked by a county superintendent, which shall act as a stay of proceedings for a period of 30 days; to the State board of education when revocation is by State superintendent, which appeal shall act as a stay of proceedings until the next regular or special meeting of said board.
Pennsylvania (acts of 1911, house bill No. 312, art. xiii): All State certificates or indorsements of certificates of other States. Provisional or professional certificates.	Superintendent of public instruction. Superintendent who grants them or under whose supervision their holders are teaching.	Incompetency, cruelty, negligence, immorality, or intemperance. do.....	Reasonable notice in writing must be given to the parties interested. There must be a hearing in all cases unless the facts are personally and officially known to the superintendent revoking. Do.
Rhode Island (laws relating to education, 1910, p. 20): Any certificate.	State board of education.	Cause.	Due notice shall be given to the holder before revocation, and an opportunity for a hearing if desired.
South Carolina (school laws, 1909, pp. 12, 21, 23): State certificate.	do..... County board of education.	Immorality, unprofessional conduct, profanity, or evident unfitness for teaching. .....do.....	Subject to appeal to State board of education.
Any county certificate. South Dakota (school laws, 1909, pp. 6, 17, 18, 44): Life diplomas and State certificates. First, second, third grade and primary certificates.	State superintendent. County superintendent.	Same as causes enumerated for revocation of certificates by county superintendent. Any cause which would have prevented the issue of the same, incompetency, immorality, intemperance, violation of the State law, cruelty, general neglect of the business of the school, and refusal and neglect to attend regularly a county institute and at least one district institute each year, provided that holders of first-grade or higher certificates in force, who have attended regu-	Process similar to revocation of certificates by county superintendent. Within 10 days after revocation, the county superintendent shall transmit a written statement to the accused stating causes for revocation, and shall also forward a copy of such statement to the State superintendent. The aggrieved may serve a written notice of appeal to the State superintendent within 10 days after receipt of such notice, specifying the grounds

Any certificate.....	upon which the appeal is taken. Thereupon the State superintendent shall provide for a fair review.
Tennessee..... Texas (school laws, 1909, pp. 19, 39, 44): Any certificate.....	Before cancellation of certificate the holder thereof shall be notified, and shall have an opportunity to be heard. The charges and evidence must be submitted, under oath and in duplicate, that the accused may be furnished a copy of the same. He shall have the right to appeal to the State superintendent, and, when certificate is canceled by State superintendent, to the State board of education.
Do.....	
Any permanent State certificate.....	
Any permanent county certificate.....	
Utah (school law, 1909, pp. 6, 14, 18, 86, 87): Any State diploma or State certificate, or any certificate issued by the State board of education.....	Hearing given the accused.
Any certificate.....	Due examination and inquiry into the case.
Any city certificate.....	Revocation on charges preferred by city board of examiners.
Vermont (school laws, 1907, p. 271): Any certificate or permit.....	Written notice of such revocation shall be given to the teacher and to one of the board of school directors or trustees.
Virginia (school laws, 1907, p. 128): Any certificate.....	Appeal may be taken to the State board of examiners within 30 days of the revocation of a certificate.
Early at least four normal institutes, may be excused by the county or the State superintendent, from attendance at county institutes for such current year. Failure to make required reports works forfeiture of certificate.....	
Authority issuing, or State superintendent.....	(a) Conducting school in violation of State laws, or unworthiness to instruct youth; (b) resignation before term of contract expires, without good cause, or without consent of the trustees who are a party to the contract.
County superintendent.....	Willful and persistent absence from county teachers' institute, or the district institute in independent districts.
State superintendent.....	Void by withdrawal from school work for a period of three years.
County superintendent.....	do.....
State board of education.....	(a) Immoral or unprofessional conduct, or unmistakable evidence of serious infectious or hereditary disease, or evident unfitness for teaching; (b) certificate forfeited if holder allows a period of five years to elapse without following some educational pursuit.
County board of examiners.....	Neglect or refusal to give instruction in any subject required by law.
City board of education.....	Immoral and unprofessional conduct, profanity, intemperance, or evident unfitness for teaching.
Authority issuing the same.....	Incompetence or other unfitness to teach in a public school.
Division superintendent.....	Cause.....

TABLE 34—*Suspension and revocation of certificates*—Continued.

Names or kinds of certificates.	Officer empowered to suspend or revoke.	Grounds upon which suspension or revocation may be made.	Process.
Washington (school laws, 1909, pp. 70, 91, 123, 124): Any certificate.....	Authority issuing the same..	Immorality, violation of written contract, intemperance, crime against the law of the State, or any unprofessional conduct.	Charges may be preferred by any superintendent. The defendant shall be given an opportunity to be heard. In case any certificate is revoked, the holder shall not be eligible to receive another teacher's certificate for a period of 12 months after the date of revocation. The aggrieved shall have the right of appeal; On revocation by county superintendent the appeal lies to the State superintendent; on revocation by State superintendent the appeal lies to the State board of education; On revocation by the faculty of the State university, the State college, or the normal schools the appeal lies to the State board of education. An appeal to State superintendent shall operate as a stay of proceedings for a period of 30 days, and an appeal to the State board of education shall operate as a stay of proceedings till the next regular or special meeting of said board. Certificate is not forfeited until a declaration of the forfeiture has been made by the proper authority.
Do.....		(a) Nonattendance at institute renders a certificate forfeitable unless there is excuse; (b) the use of tobacco or any other narcotic on the school premises shall work a forfeiture of certificate.	
West Virginia (school laws, 1908, pp. 43-44, 58): State professional certificate. Any certificate issued under the uniform examination system.	State board of education..... State superintendent.....	Good cause..... Drunkenness, immorality, or untruthfulness, or any other cause which would have justified the withholding thereof when the same was granted, or any neglect or refusal to perform his duties.	
Wisconsin (school laws, 1909, pp. 79, 81): Any State certificate or license, or their equivalent.	State superintendent.....	Incompetency or immoral conduct.....	
Any county certificate.....	County superintendent.....	Immoral character, deficiency in learning, or inability to teach.	
			Before revocation the holder shall be served with a written statement of the charges against him, and shall have an opportunity for defense. The superintendent shall give to the complainant, the teacher, and the board by whom he is employed, at least 10 days' notice, in writing, containing a statement of the charges and of the time and place when and where he will hear the same. He shall proceed according to the notice to hear the proofs on either side, and give the accused an opportunity of defense. In case of annulment the teacher shall not be disqualified thereby until notice containing his name, the date of and reasons for such annulment be filed in the office of the town clerk

and a copy thereof delivered to the clerk of the district in which the teacher is employed. Any annulment of a certificate is subject to appeal and to reversal by the State superintendent.

Revocation takes place on recommendation of the State board of examiners.

Wyoming (school laws, 1909,
p. 125):
Any certificate.....

State superintendent.....

Gross inefficiency or immoral character.....

RECOGNITION OF DIPLOMAS AND CERTIFICATES OF EDUCATIONAL INSTITUTIONS GRANTED IN OTHER STATES AND OF TEACHERS' CERTIFICATES ISSUED IN OTHER STATES.

Diplomas from certain educational institutions are generally recognized either as valid teachers' certificates in themselves or as partial or complete fulfillment of the requirements for a certificate in the State in which the institutions are located. But the recognition of diplomas from institutions not located in the State is not nearly so general. In fact, there are 11 States that give no recognition whatsoever to such diplomas—Connecticut, North Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Arkansas, and Iowa. But in addition there are 3 others that merely accept the grades in subjects covered by the certificates and require examination in the remaining subjects—Oklahoma, Ohio, and Colorado, while 1 other—Maine—merely gives the diploma consideration in determining the duration of the certificate, requiring examination in all subjects. There thus remain 33 States in which recognition is established upon a plane of comity.

At least 21 States keep accredited or approved lists of educational institutions whose diplomas are recognized by them. The laws of 12 States specifically require that the institutions shall be of equal rank with those of the State in which recognition is sought. Five States require previous experience of the applicant—New York, North Dakota, Montana, Colorado, and Idaho.

Recognition of certificates issued by other States is not so general as recognition of diplomas of educational institutions. Only 30 States grant recognition of any kind. Those which do not are:

North Atlantic: Maine, New Hampshire, Connecticut.

South Atlantic: Delaware, Maryland, North Carolina, Louisiana, Florida.

South Central: Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Arkansas.

North Central: North Dakota.

Western: Montana.

The following States demand the establishment of "reciprocal relations" before the certificates of another State will be recognized: New Jersey, Virginia, West Virginia, South Carolina, Missouri, Kansas, and New Mexico. The laws or regulations or practice of 13 States sanction the recognition of only the highest grade or grades of certificates, as follows:

North Atlantic: New York, New Jersey.

North Central: Ohio, Maryland, Delaware, Michigan, Wisconsin, Kansas.

Western: Wyoming, New Mexico, Idaho.

The following States recognize any certificate issued by a State department: Virginia, Iowa, South Dakota (above second grade),

Nebraska, Washington, and Oregon. The last three accept credits only and those must be above specified percentages.

The laws of 11 States require that the certificates be of equal rank with those in the State. Oklahoma grants merely credits which the certificate covers.

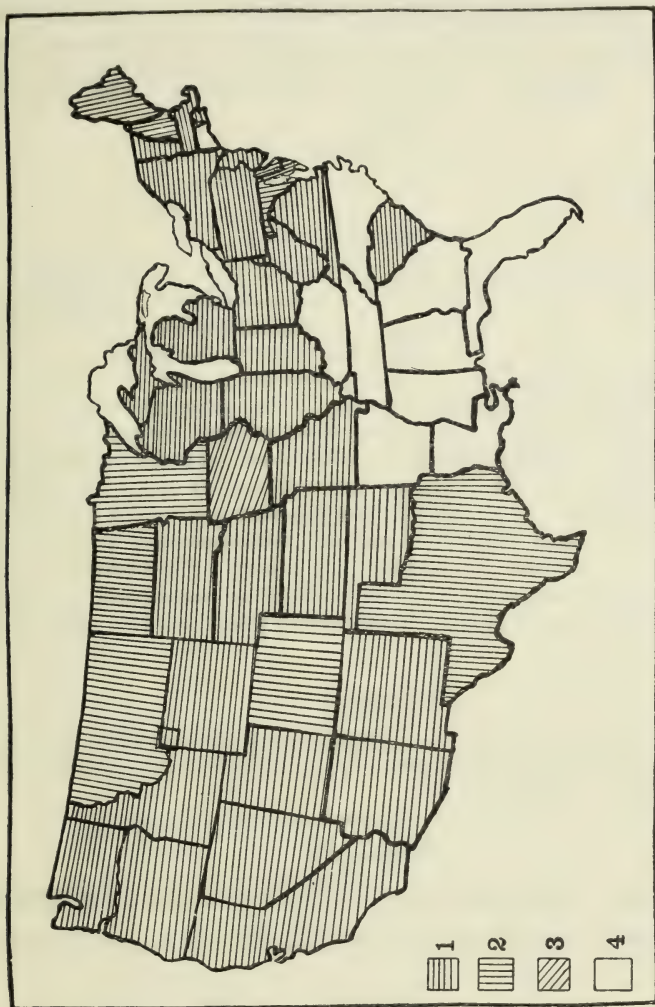


FIGURE 10.—States which give some recognition, however slight, to diplomas of educational institutions situated in other States and to certificates issued in other States: 1, States which recognize both diplomas and certificates; 2, States which recognize diplomas but not certificates; 3, States which recognize certificates but not diplomas; 4, States which recognize neither diplomas nor certificates.

A DIGEST OF THE LAWS AND REGULATIONS BEARING UPON THE RECOGNITION OF DIPLOMAS AND CERTIFICATES IN EACH OF THE STATES.

ALABAMA.

Diplomas.—None. (Memorandum from the State office.)

Certificates.—None. (Memorandum from the State office.)

ARIZONA.

Diplomas.—A graduate of a standard college or university who has had one year's work in pedagogy, certified to by a professor of pedagogy, is given a first-grade Territorial certificate.

A graduate, except in the kindergarten department, of a normal school whose courses are equivalent to the Arizona Normal School is also given a first-grade Territorial certificate. (Regulations of Territorial board of education, in School Laws, 1907, p. 80.)

Certificates.—A holder of a life diploma issued by State authority is granted a first-grade certificate. (Regulations of Territorial board of education, in School Laws, 1907, p. 80.)

ARKANSAS.

Diplomas.—None.

Certificates.—None.

CALIFORNIA.

Diplomas.—"No credentials shall be prescribed or allowed unless the same in the judgment of said [State] board [of education] are the equivalent of a diploma of graduation from the University of California and are satisfactory evidence that the holder thereof has taken an amount of pedagogy equivalent to the minimum amount of pedagogy prescribed by the state board of education of this State. * * *

"The said board shall also consider the cases of individual applicants who have taught successfully for a period of not less than 20 school months, and who are not possessed of the credentials prescribed by the board under the provisions of this section. The said board, in its discretion, may issue to such applicants special credentials, upon which they may be granted certificates to teach in the high schools of the State. In such special cases, the board may take cognizance of any adequate evidence of preparation which the applicants may present. The standards of qualification in such special cases shall not be lower than that represented by the other credentials named by the board under the provisions of this section." (School Laws, 1909, pp. 12-13.)

Certificates.—See diplomas.

COLORADO.

Diplomas.—Grades given for work in educational subjects accepted the same as grades from the State institutions of Colorado, provided the applicant has taught two years. (Memorandum from State office.)

Certificates.—None. (Memorandum from State superintendent.)

CONNECTICUT.

Diplomas.—None. (Letter from secretary of State board of education, dated Sept. 12, 1910.)

Certificates.—None. (Letter from secretary of State board of education, dated Sept. 12, 1910.)

DELAWARE.

Diplomas.—May be issued at the discretion of the county superintendents upon presentation of "diplomas or certificates of graduation from any respectable normal school or college." (School Laws, 1908-9, p. 55.)

Certificates.—None.

FLORIDA.

Diplomas.—None. (Letter from State office, Sept. 14, 1910.)

Certificates.—None. (Letter from State office, Sept. 14, 1910.)

GEORGIA.

Diplomas.—Strictly forbidden. (Laws, 1910, p. 39.)

Certificates.—None. (Memorandum from State office.)

HAWAII.

Diplomas.—Diplomas and certificates of other States or Territories may be received as equivalent to Hawaiian certificates as follows: (a) University degree, grammar-grade certificate; (b) Normal diplomas, Hawaiian normal diploma; (c) State or Territorial grammar-grade certificates, grammar-grade certificate; (d) First-class county certificates, primary-grade certificate.

Certificates.—See above.

IDAHO.

Diplomas.—The State board of education may issue a State certificate to a graduate of an advanced course of a State normal school of another State who holds a State or life certificate in such State, or to a graduate of a chartered college, the bachelor's degree of which is accepted by the State university of the same State, if the applicant has taught 18 months, provided part of this experience has been within two years preceding date of application. (Acts of 1911, H. B. 240, art. 10, sec. 91.)

Certificates.—See above.

ILLINOIS.

Diplomas.—Graduates from approved colleges, universities, and normal schools are admitted to examination on the same basis as graduates of like institutions within the State. (Circular, department of public instruction, No. 42, p. 4, Nov. 1, 1909.)

Certificates.—Holders of life certificates from other States, the requirements of which are equal to those of Illinois, may enter the examination for any one of the certificates under Plan II, which requires an examination in three professional subjects and a thesis. (Circular, department of public instruction, No. 42, p. 4, Nov. 1, 1909.)

INDIANA.

Diplomas.—Graduates of approved universities, colleges, and State normal schools are eligible for licenses in Indiana upon the same basis as graduates of like institutions within the State.

"A State normal diploma that represents three full years' normal-school work preceded by four years' high-school work may be countersigned by the superintendent of public instruction, provided the holder of it has taught successfully for two years since graduation. When so signed it becomes valid for life in any of the public schools of the State.

"A diploma from a kindergarten training school that has been approved by the State board of education may be countersigned by the superintendent of public instruction and made a valid life license for kindergarten work." (Indiana Teachers' Licenses, Charles A. Greathouse, 1910, p. 10; School Laws, 1907, pp. 20-21.)

Certificates.—A life certificate from another State that has been granted upon examination and is equivalent to the life license examination in Indiana may be countersigned by the superintendent of public instruction. When so signed it becomes valid for life in any of the public schools of the State. (Indiana Teachers' Licenses, Charles A. Greathouse, 1910, p. 9.)

IOWA.

Diplomas.—None. (School Laws, 1907, p. 11.)

Certificates.—The State educational board of examiners is empowered "to validate certificates issued by State departments of education in other States where such certificates were issued upon evidence of scholarship and experience equivalent to that required for like certificates" under the laws of Iowa. Such validated certificate is valid in any public school in the State for five years after date of such validation. (Department of public instruction, Circular No. 5, 1911.)

KANSAS.

Diplomas.—Graduates of educational institutions on the accredited list are granted a three-year renewable certificate upon presentation of proper credentials. Any college, university, or educational institution of like standing which requires a four-year high-school course, or its equivalent, approved by the State board of education, as a condition of admission to its freshmen class, and whose course of study and the character of work done are, in the judgment of said board, of such standing as to prepare its graduates to teach successfully in the public schools of the State, and which has a department of education, the prescribed course of which is satisfactory to the State board of education, may be placed on the accredited list by said board. (Laws, 1911, ch. 276.)

Certificates.—The law provides that when the State board of education is satisfied that any resident of Kansas holding a State certificate of another State secured the same by passing an examination equivalent to that given by said board, it may issue to said person a State certificate. The practice of the board is to issue a three-year renewable certificate to persons holding State life certificates or certificates which may be renewable into State life certificates, from those States whose offices extend reciprocal relations. (Manual of board of education, State of Kansas, 1910, p. 37; letter from State superintendent of public instruction, dated Sept. 27, 1910.)

Reciprocal relations.—Reciprocal relations covering the indorsement of the highest grade of life certificates have been established without limitation with six States, as follows: Iowa, Nebraska, New Jersey, Pennsylvania, South Dakota, and Virginia.

The following limitations have been placed upon indorsements of certificates and diplomas issued in other States: Indiana, Missouri, and Oregon, if issued on examination; North Dakota, if applicant is a graduate of a normal school, college, or university; Michigan, New York, Ohio, Rhode Island, and Utah, each case is considered on its merits; Washington, option of State board.

Forty-four colleges, located in 16 different States, have been placed upon the accredited list.

Reciprocal relations have been established without limitation in the recognition of the highest grade of State normal-school diplomas with the following nine States: Indiana, Iowa, Minnesota, Nebraska, New Jersey, New York, Pennsylvania, South Dakota, and Virginia. Limitations are imposed as follows: Michigan, Rhode Island, and Utah, each case is considered on its merits; North Dakota, the course must cover the Kansas requirements; Arizona, professional examination is required; Vermont, may consider certain cases; Washington, option of State board. (Manual of the board of education, 1910, pp. 35, 37-38.)

KENTUCKY.

Diplomas.—None. (Memorandum from State office.)

Certificates.—None. (Memorandum from State office.)

LOUISIANA.

Diplomas.—None, except from Peabody Normal College. (Laws, 1908, p. 68.)

Certificates.—None. (Memorandum from State office.)

MAINE.

Diplomas.—No exemption from examination and other requirements. Diplomas are given weight in the determination of the grade of certificate to be issued upon the same basis as graduates of institutions within the State. (Memorandum from State office.)

Certificates.—None. (Memorandum from State office.)

MARYLAND.

Diplomas.—The State superintendent may, with the approval of the State board of education, recognize and indorse diplomas of State normal schools and of other normal schools, and of colleges with a department of pedagogy when he is satisfied with the character of the instruction given and the length of time that has been spent in such institution by the applicant. (School Laws, 1910, p. 12.)

Certificates.—None. (Memorandum from State office.)

MASSACHUSETTS.

Diplomas.—Diplomas of standard normal schools, colleges, and universities are generally recognized, except in cities, as sufficient warrant for the granting of local certificates. (Memorandum from State office.)

Certificates.—School committees, except those in certain cities, generally recognize certificates issued in other States and issue certificates based upon them. Practice varies greatly as to the grades of certificates that are thus recognized. (Memorandum from State office.)

MICHIGAN.

Diplomas.—The State board of education may indorse normal school diplomas or certificates "if it be shown to the satisfaction of said board that such certificates are for life and that the * * * examinations required or courses of study pursued are fully equal to the requirements of this State." (School Law, 1909, p. 140.)

Certificates.—The State board of education may indorse State teachers' certificates granted upon examinations or other State certificates granted in other States "if it be shown to the satisfaction of said board that such certificates are for life and that the examinations required or courses of study pursued are fully equal to the requirements of this State." (School Law, 1909, p. 140.)

MINNESOTA.

Diplomas.—Graduates of accredited universities, colleges, and of advanced courses of State normal schools are placed upon the same basis as graduates of institutions within the State. The basis for determining whether a college or university shall be placed upon the accredited list is the University of Minnesota, including its department of pedagogy. (Pamphlet issued by the department of public instruction, 1909, Certification and employment of teachers, p. 5.)

Seventy-six universities and colleges outside of Minnesota, located in 21 different States, and 49 State and private normal schools, located in 23 different States, have been placed upon the accredited list. (Pamphlet issued by the department of public instruction, 1909, Certification and employment of teachers, pp. 6-8.)

Certificates.—None. (Pamphlet issued by the department of public instruction, St. Paul, Minn., June, 1908, entitled "Circular of information relating to examinations, certificates," etc., p. 7.)

MISSISSIPPI.

Diplomas.—None. (Memorandum from State office.)

Certificates.—None. (Memorandum from State office.)

MISSOURI.

Diplomas.—Diplomas from colleges and universities of equal rank to those in the "Missouri College Union" are placed on the same basis as graduates of those institutions. (See scholarship requirements, Table 1.) Some concessions are made to graduates of State and private normal schools in other States. (Memorandum from State office; letter from State office, dated Sept. 30, 1910.)

Certificates.—The State superintendent will recognize certificates from other States with which reciprocal relations have been established, provided the certificates are

equal to those issued in Missouri, and provided further, applicant has had experience in teaching. (Memorandum from State office, and circular, "Requirements for State certificates, 1910.")

MONTANA.

Diplomas.—The law provides that State or life diplomas may be granted to graduates of educational institutions without the State upon conditions established by the State board of education. The board grants to graduates of reputable colleges, universities, and the advanced courses of normal schools certificates without examination when such graduates have had 18 months' successful experience after graduation and have become resident teachers of Montana. (Laws, 1908, p. 16; report of State superintendent of public instruction, 1908, p. 51; letter from State office, Sept. 29, 1910.)

Certificates.—None.

NEBRASKA.

Diplomas.—Professional State certificates may be granted to any person who is a graduate of a college or university of good standing and who has had three years' successful experience in Nebraska and who holds a first-grade county certificate. The same certificate may also be granted to the holder of a life diploma from a State normal school of another State. (Laws, 1909, p. 75.)

Certificates.—A professional State certificate may be granted at the discretion of the State superintendent to the holder of a professional State certificate from another State. (Laws, 1909, p. 75.)

"The holder of a county certificate granted by another State who desires recognition in Nebraska must register as above [in the county in which he desires to teach, pay the regular fee, and secure an examination number]. The Nebraska county superintendent may request that all grades of 80 or above, if earned before a State examining board, be recorded by the State department and require the applicant to pass examination in all subjects below 80 included in the desired certificate. If the grades were not earned before a State examining board, the applicant must take examination in arithmetic, reading, history, geography, and grammar and in all other subjects included in the desired certificate for which no grades are given." (Employment and certification of teachers. Complete rules, 1911, pp. 20-21.)

NEVADA.

Diplomas.—"Graduates of universities, colleges, and normal schools approved by the State board of education shall be permitted to submit their credentials from such institutions, and to the extent that these credentials give evidence of scholarship and professional preparation they shall be accepted in lieu of examination; provided, that no certificate of the elementary grade shall be granted upon any credentials not equivalent to a diploma of graduation from the Nevada State Normal School; and provided further, that no high-school certificate shall be granted upon any credential not equivalent to a diploma of graduation from a science course or the liberal arts course of the University of Nevada, together with the required training in educational subjects." (Laws, 1911, ch. 133.)

Certificates.—"Any teacher holding a life certificate from another State shall be permitted to submit such certificate as evidence of his or her fitness for teaching, and if the State board of education shall be satisfied that the State which issued such certificate maintains a high professional standard, said board may issue a certificate for teaching in this State of such grade as it shall deem proper." (School Laws, 1909, p. 20.)

NEW HAMPSHIRE.

Diplomas.—Graduates of colleges, universities, and normal schools outside the State are treated upon the same basis as graduates of colleges and private normal

schools within the State—that is, credits are accepted for subjects in group 3, examination for high-school certificates. See Table A. (Memorandum from State office.)

Certificates.—None. (Memorandum from State office.)

NEW JERSEY.

Diplomas.—"11. In any examination for a teacher's certificate the diploma of a university or college authorized to confer degrees may be accepted in lieu of an examination in the subjects prescribed for such examination; provided, that the course of study covered by said diploma shall include said prescribed subjects or their equivalent, shall not have been pursued through correspondence, and shall have been approved by the State board of examiners."

"14. The State board of examiners may grant a second-grade State certificate, valid for two years, to the holder of a diploma of any normal school or teachers' college, or a permanent certificate to teach in another State and valid as a State certificate therein, when the course of study of such normal school or teachers' college or the requirements for such certificate shall be, in the judgment of said board, equivalent to those required for a State certificate to teach in this State; provided, that such other State shall grant reciprocal privileges to those holding similar diplomas or certificates issued in this State. After the expiration of said two years the said normal school diploma, teachers' college diploma, or permanent State certificate * * * may be indorsed by the State board of examiners; provided, the holder thereof shall have taught not less than two years in this State, shall have given satisfactory evidence of efficiency and success as a teacher, and shall file approved testimonials. When so indorsed such diploma or certificate shall have the same force and effect as if issued in this State. Normal school diplomas issued in States not having a State system of certification * * * may be indorsed as hereinabove provided." (Rules and regulations of State board of education, in School Laws, 1908, pp. 151-152.)

Certificates.—See last paragraph above.

Reciprocal relations have been established under rule 14 with Canada and with 11 States, as follows: Connecticut, Indiana, Kansas, Massachusetts, Michigan, New York, Pennsylvania, Rhode Island, Washington, West Virginia, and Wisconsin. (Letter from State superintendent, Sept. 27, 1910.)

NEW MEXICO.

Diplomas.—The State board of education is authorized to issue certificates "to persons whom it may deem qualified." It appears from this that credits may be accepted for studies irrespective of graduation. (School Laws, 1909, p. 202.)

Certificates.—The Territorial board of education is "empowered to officially indorse teachers' certificates granted in States and other Territories, under such rules as it may prescribe." No regulations have as yet been printed. The acts of the State board as found in the reports of the Territorial superintendent of public instruction make it appear that as a rule only certificates of the highest grade are recognized and only from those States with which reciprocal relations have been established. (School Laws, 1909, p. 202; report of the Territorial superintendent of public instruction for biennium ending June, 1908, p. 28.)

The Territorial board of education has taken the following action regarding the recognition of certificates and diplomas issued in other States:

Consideration is given transcripts of credits submitted from educational institutions in all States. Reciprocal relations have been established with Michigan, Missouri, Minnesota, Nebraska, Oklahoma, Kansas, and Wyoming, whereby certificates equivalent to New Mexico county first grade or higher are recognized in so far as the requirements are equivalent to those specified for New Mexico licenses. (Memorandum from State office.)

NEW YORK.

Diplomas.—The commissioner of education may in his discretion indorse diplomas of approved colleges and normal schools. Graduates of colleges approved by the education department, in a course approved by that department, may be granted a limited certificate, valid for two years. If the course taken by the applicant includes a course in education under the regulations of the education department, he may be granted a college graduate professional provisional certificate, valid for three years. Life certificates are granted after three years' successful experience. (Handbook 7, education department, 1910, pp. 25-29. Education Law, 1910, p. 120. Bulletin 474.)

"The commissioner of education 'may also, in his discretion, indorse a diploma issued by a State normal school or a certificate issued by a State superintendent or State board of education in any other State, which indorsement shall confer upon the holder thereof the same privileges conferred by law upon the holders of diplomas or certificates issued by State normal schools or by the commissioner of education in this State.'

"This discretion will be exercised on evidence that the standards on which such diplomas and certificates were based are equal in value to standards in this State and that the applicant has proved to be a successful teacher for at least two years.' (Handbook 7, education department, July, 1908, p. 26.)

Certificates.—See last two paragraphs above.

NORTH CAROLINA.

Diplomas.—Graduates of institutions outside the State are placed upon the same basis as graduates of institutions within the State, examination being required of all without concessions. (Memorandum from State office.)

Certificates.—None. (Memorandum from State office.)

NORTH DAKOTA.

Diplomas.—Recognition of diplomas granted by institutions outside of State placed on the same basis as those within. A normal school must have a reputation "for thoroughness;" a college or university must be "of recognized standing;" and the applicant must have taught for at least 18 months after graduation. If these requirements are met, a first-class State certificate may be issued. (School Laws, 1908, p. 78.)

Certificates.—None. (Memorandum from State office.)

OHIO.

Diplomas.—The law makes no distinction between Ohio institutions and those of other States. "The diploma of any normal school, teachers' college, college, or university approved by the State commissioner of common schools shall entitle the holder thereof when he or she has successfully passed the examination approved in section 5 of this act to a professional elementary-school certificate. * * * Provided, said diploma is granted only to such students as have taken a full two-year academic and professional course, entrance to which shall require graduation from a high school of the first grade." If the course is a four-year academic and professional course, a provisional high-school certificate may be issued. It is required that each of these courses shall include actual teaching under supervision in a training school, including elementary or secondary grades, respectively. A memorandum from the State office states, however, "no diplomas honored." (Session Laws, 1910, p. 317; memorandum from State office dated Sept. 19, 1910.)

Certificates.—"Life certificates known as professional State certificates issued by other States may be recognized by the board under the following conditions:

"The applicant for recognition of a certificate issued by another State shall register in the regular form.

"He shall attend the examination at which his case is to come before the board.

"He shall file the certificate to be honored with the grades in the branches covered by the certificate and a copy of the questions upon which certificate filed was granted.

"He shall take the examination in the branches required in Ohio not covered by his certificate." (Leaflet from Ohio State board of school examiners, respecting date of examination, etc.)

OKLAHOMA.

Diplomas.—The State board of education accepts grades received in subjects required in an examination from those State institutions which appear on its accredited list; it does not issue certificates upon diplomas. (Circular issued by State superintendent.)

Certificates.—The State board of education accepts grades which appear upon State certificates issued by other States, or which are certified to by the State superintendent; it does not issue a certificate upon a State certificate from another State. Grades from a first-grade county certificate and reading circle grades will be accepted also, provided they are of the required average. (Circular issued by State superintendent.)

OREGON.

Diplomas.—Credits from institutions outside the State are placed upon the same footing as credits from institutions within the State. (Memorandum from State office.)

Certificates.—Credits secured upon examination by State authorities from other States shall be accepted by the superintendent of public instruction when secured in accordance with the following requirements:

1. When obtained by examination for the corresponding grade of certificate; provided, the examination questions were prepared and answer papers were graded by the State department of education, the standings received in other States shall be accepted subject for subject; provided, that the passing standing shall not be less than 80 per cent in any one subject; provided, further, that in determining the corresponding grade of certificate this recognition of credits shall apply to any certificate regardless of territorial restrictions in the State wherein such certificate was issued.

2. Equivalent credits for any subject or subjects may be accepted at the discretion of the superintendent of public instruction of Oregon.

3. Credits for successful teaching experience may be allowed in accordance with the regulations in force in this State.

4. Certificates or credits subject to interstate recognition shall enjoy the same privileges as similar certificates or diplomas in this State subject to the experience requirements of this State.

PENNSYLVANIA.

Diplomas.—The superintendent of public instruction may validate in this Commonwealth teachers' certificates issued by other States or by the State normal schools or colleges of other States whose requirements are equivalent to those of this Commonwealth. He may revoke such validation of certificates at any time.

Certificates.—(See above.)

RHODE ISLAND.

Diplomas.—Each case considered on its merits. No discrimination against outside diplomas. (Memorandum from commissioner of public schools.)

Certificates.—Each case considered on its merits. Qualifications for each certificate considered. When approved, apparently full recognition and no discrimination against outside certificates. (Memorandum from commissioner of public schools.)

SOUTH CAROLINA.

Diplomas.—Diploma of graduation from reputable university or college situated in another State and of as high rank as leading colleges in the State are accepted upon the same basis as diplomas from these colleges. A State certificate may be issued upon such a diploma without examination. (Regulations of board of education in School Laws, 1909, p. 58, rule 10.)

Certificates.—Recognition accorded certificates from such other States as grant similar recognition to certificates in South Carolina. (Memorandum from State office.)

SOUTH DAKOTA.

Diplomas.—A diploma from an approved university or college giving four years' work above a four-year high-school course is accepted in lieu of subjects required for a life diploma, provided one-fourth of such university or college course for 18 months was devoted to professional training. If a less amount of time was given to professional subjects, these subjects may be passed by examination.

A diploma from any approved State or private normal school having a two-year course of study above a four-year high-school course may likewise be accepted as above. (Laws, 1909, p. 5.)

Certificates.—The State superintendent may validate certificates issued by other departments of education which are of the rank of the life diploma, State certificate, and first and second grade certificates issued in South Dakota, provided the requirements upon which they are based are equivalent to the requirements for corresponding certificates in South Dakota. (Laws, 1909, p. 6.)

TENNESSEE.

Diplomas.—None.

Certificates.—None.

TEXAS.

Diplomas.—"Sec. 103. *Certificates based on college degrees.*—Any person who holds a diploma conferring on him the degree of bachelor of arts, or any equivalent bachelor's degree, or any higher academic degree, from any college or university of the first class, and who has completed four full courses in education and pedagogy may receive from the State superintendent of public instruction a permanent State certificate, which shall be valid anywhere in this State during good behavior: *Provided*, That any person who holds a diploma conferring on him the degree of bachelor of arts, or any equivalent bachelor's degree, or any higher academic degree, from any college or university of the first class, who has not had four full courses in education but who has taught three years in the State, may receive from the State superintendent of public instruction a permanent State certificate which shall be valid anywhere in this State during good behavior. The institutions to be recognized as colleges or universities of the first class shall be determined by the State superintendent of public instruction upon the recommendation of the State board of examiners." (School Laws, 1909, pp. 40-41.)

Certificates.—None.

UTAH.

Diplomas.—"The State board of education has the power to accept credits, certificates, and diplomas from other States and from institutions of learning in lieu of examination." (Circular letter signed by State superintendent of public instruction.)

Certificates.—"Life diplomas issued by State boards in other States and shown to be of equal rank with those issued by the State board of this State may receive equal recognition after the holders acquire two years' successful experience in schools of this State. When countersigned by the State superintendent of public instruction under the direction of the State board, such diplomas shall have equal validity with

those of corresponding rank issued by the State board." Temporary certificates are issued to those who lack experience in Utah. (School Law, 1909, p. 5.)

See also diplomas, above.

VERMONT.

Diplomas.—Graduates of institutions outside of the State are treated upon the same basis as graduates from institutions within the State. Graduates from approved colleges and normal schools are required to have less experience in the granting of all certificates than those persons who are not graduates. (Act 1908, ch. 37.)

Certificates.—The holder of any certificate that is valid for two or more years is eligible to a special third-grade or one year's certificate. (Letter from State superintendent, Sept. 29, 1910.)

VIRGINIA.

Diplomas.—"For schools and colleges outside Virginia the State board of examiners may accept any certificate that would be accepted by the State authorities of the State from which the certificate comes and may issue a Virginia certificate of such grade and life as may seem warranted by conditions attending the individual case." (Regulations State board of education, School Laws, 1907, p. 12.)

Certificates.—The State board of examiners endeavors to grant the same recognition to certificates from other States as is extended Virginia certificates of like grade by the department of public instruction of those particular States. (Letter from E. H. Russell, Sept. 14, 1910.)

WASHINGTON.

Diplomas.—The State board of education is authorized to grant certificates without examination, except in the State Manual of Washington, to graduates of those normal schools, colleges, and universities, and other institutions of higher education which have been approved by it, provided the entrance and graduation requirements of these institutions must be equal to those of the University of Washington or of the advanced course of the State normal schools of Washington. (Laws, 1909, p. 13.)

Certificates.—The State board of education is authorized to issue certificates without examination, except in the State Manual of Washington, to the holders of State life certificates, the requirements of which have been found by them to be equal to the requirements for a life certificate in Washington. (Laws, 1909, p. 13.)

"Credits of 90 per cent or over on a valid certificate obtained by examination in any other State in which the examination questions are prepared and answer papers graded by the State department of education may be accepted subject for subject in accordance with the rules and regulations prescribed by the State board of education." (Laws, 1911, ch. 16.)

WEST VIRGINIA.

Diplomas.—"The State board of education may also issue certificates to teachers coming from other States when such teachers hold certificates or diplomas of equal value with those issued under this act: *Provided*, That the States which issue such certificates likewise recognize those issued in this State." (School Laws, 1908, p. 58.)

Certificates.—See diplomas above.

WISCONSIN.

Diplomas.—The holder of a diploma of a university or college whose regular college courses are fully and fairly equivalent to corresponding courses of the University of Wisconsin, or the holder of a diploma granted by a State normal school whose courses of study are fully and fairly equivalent to the courses of study in the Wisconsin normal schools and who has had two years' experience after the date of issuance of such diploma, may, if recommended favorably by the State board of examiners, be granted an unlimited State certificate; if the holder of the diploma is lacking in experience,

he may be granted a special license valid for two years. (School Laws, 1909, pp. 83-84.)

Certificates.—The holder of a life certificate in another State, the requirements for which are equivalent to those of the unlimited certificate in Wisconsin, who has had two years' experience in Wisconsin subsequent to the date of the foreign certificate, may be granted an unlimited certificate; if he is lacking in experience, a special license may be granted him valid for a period of two years. (School Laws, 1909, pp. 81-82.)

WYOMING.

Diplomas.—“Exemption certificates granted to graduates of the State Normal School and other schools of the University of Wyoming may be granted to the graduates of other normal schools and colleges of equivalent rank. The State board of examiners shall be the judge of equivalency.” (School Laws, 1909, p. 127.)

These certificates are made valid for such a period as is necessary to give the holder the experience required for a life certificate.

Certificates.—“Certificates granted in other States and of as high rank as the first or second class certificates having requirements equivalent to those in this State may be given the same validity in this State. The State board of examiners shall be the judge of equivalency.” (School Laws, 1909, p. 127.)

Under this regulation, recognition is not limited to “State” certificates.

APPENDIX.

ACTS OF VARIOUS LEGISLATURES PASSED DURING THE WINTER OF 1911 AND NOT REFERRED TO IN TABLE 1.

HAWAII.

[Department of public instruction circular.]

"Primary and grammar grade certificates issued by this department and diplomas granted by the Honolulu Normal School are recognized teaching certificates."

Grammar grade certificates issued on examination embrace the following subjects: (a) subject matter of course of study except manual training and calisthenics; (b) geometry, book I to IV; algebra to quadratics; (c) universal history; (d) school management and methods of teaching.

Primary certificates issued on examination embrace the following subjects: (a) same as above; (b) methods of teaching; (c) school management.

IOWA.

[State Department circular No. 5—1911.]

County first-grade and special certificates shall be validated for life by the State board of educational examiners upon fulfilling the following conditions:

1. Testimonials from county or city superintendents or from the principals having immediate supervision of his school work and from a member of the local school board that applicant has had at least five years' continuous successful teaching experience (either before or after the passage of this act), three of which shall have been immediately prior to the time validation is sought and under the grade of certificate for which such validation is desired.

2. Applicant's certificate must show an average of not less than 85 per cent and no branch less than 80 per cent, applicant being privileged to be reexamined at any regular examination in any branch or branches to raise his percentage to the required grade.

3. Applicant must furnish proof of professional study during the entire five-year period such as is made necessary in the case of term renewals of certificates.

OREGON.

[Acts of 1911, Senate bill No. 101.]

The standardizing of colleges, universities, and normal schools.—A standard college, university, or normal school is one that shall be standardized by the United States Bureau of Education, of Washington, D. C. In case of the failure of said bureau to prepare a list of standardized colleges, universities, and normal schools, or to pass upon the standard of any college, university, or normal school of Oregon, a board of such standardization, composed of the president of the University of Oregon, the president of the Oregon Agricultural College, the president of the Oregon Normal School, the city superintendent of the largest city in the State, one person selected by the Independent College Presidents' Association of Oregon, one person selected by the Catholic Educational Association of Oregon, and the superintendent of public instruction, shall meet from time to time in the statehouse at Salem, Oreg., upon

the call of the superintendent of public instruction, and shall prepare a list of the educational institutions of Oregon, which, in the judgment of the board, shall be recognized as the standard colleges and universities of Oregon, and shall pass upon the standard of any college, university, or normal school of other States seeking recognition in this State.

WEST VIRGINIA.

[Acts of 1911, House bill No. 242.]

Amends section 163 of chapter 27, acts of 1908, which requires a district superintendent to hold a first-grade certificate, by requiring in addition thereto a supervisor's certificate, which shall be issued upon application by the State board of education to persons who have taken at least six courses in education at the State university, and to graduates in the normal departments of the State normal school and its branches, and of normal departments of other schools of equivalent grade, and to applicants who shall pass a satisfactory examination in school law, school sanitation, school supervision, and methods of teaching.

NEBRASKA.

The following table, giving the principal features of teachers' certificates in Nebraska, was prepared by J. W. Crabtree, State superintendent of public instruction. It includes the city-State certificates which were authorized by the legislature at its last session. The legislature gave the State superintendent authority to determine the qualifications for the various grades of city-State certificates. His action in accordance with that authorization was received too late for inclusion in the study proper.

NEBRASKA.

[School Laws, 1911, pp. 70-79, 89. Laws of Nebraska, 1897, chap. 65; 1905, chap. 135; 1907, chap. 123; 1911, chap. 120.]

Name of certificate.	Issued by—	Valid in—		Persistence.	Renewal.	Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
		Territory.	Schools.						
Professional superintendent city-State certificate. (See Note 1 at end of outline relating to college and normal school certificates.)	State superintendent.	State.....	High-school and city-school districts.	Life.....	.....	3 years as principal.	State board of examiners.	State board of examiners.	A. Academic (above first-grade county certificate): Rhetoric, literature, geography, physical geography, zoology, general history, chemistry, trigonometry. B. Professional: Psychology, child study, school hygiene, theory of education, school management, history of education, industrial education, moral education. C. Special: Supervision of instruction, school architecture and sanitation, school organization and administration, and thesis on administration topic.
Professional high school city-State certificate (for special subjects or departments).	do.....	do.....	do.....	do.....	.....	3 years in high school.	do.....	do.....	Same as A and B above, with 8 hours' college work above 4-year high school course in department for which certificate is desired; methods of teaching subjects in special department, and thesis.
Professional grammar city-State certificate.	do.....	do.....	do.....	do.....	.....	4 years.....	do.....	do.....	Same as A and B above; grammar methods, and thesis.
Professional primary city-State certificate.	do.....	do.....	do.....	do.....	.....	.....do.....	do.....	do.....	Any 6 subjects from each A and B; primary methods, and thesis.
Professional kindergarten city-State certificate.	do.....	do.....	do.....	do.....	.....	.....do.....	do.....	do.....	Any 5 subjects from each A and B; kindergarten methods, and thesis.
Professional special supervisor or city-State certificate.	do.....	do.....	do.....	do.....	.....	.....do.....	do.....	do.....	Any 5 subjects from each A and B; methods for special department, and thesis.
Professional life (general). (May be accepted as credential for city-State certificate.)	do.....	do.....	All except largest city districts.	do.....	.....	1 year.....	do.....	do.....	All subjects in A, and psychology.
First-grade superintendent city-State certificate.	do.....	do.....	High-school and city-school districts.	3 years.....	See Note 4.	1 year as principal.	do.....	do.....	Same as A and B; supervision of instruction, school architecture and sanitation, and paper.

NEBRASKA—Continued.

Name of certificate.	Issued by—	Valid in—		Persistence.	Renewal.	Experience required.	Questions prepared by—	Papers examined by—	Scholarship requirements.
		Territory.	Schools.						
First-grade high school city-State certificate.	State superintendent.	State	High-school and city-school districts.	3 years.....	See Note 4.	1 year in high school.	State board of examiners.	State board of examiners.	Any 6 subjects from A, and 8 college hours above 4 years' high-school course in department for which certificate is desired; psychology and school management; and 3 additional subjects from B; methods in special subjects, and paper.
First-grade grammar city-State certificate.	do.	do.	do.	do.	do.	2 years	do.	do.	Any 4 subjects from A; psychology and school management and any other 3 from B; grammar methods, and paper.
First-grade primary city-State certificate.	do.	do.	do.	do.	do.	do.	do.	do.	Any 4 from A; psychology and 3 additional from B; primary methods, and paper.
First-grade kindergarten city-State certificate.	do.	do.	do.	do.	do.	do.	do.	do.	Any 3 from A; psychology and any 3 from B; kindergarten methods, and paper.
First-grade special supervisor city-State certificate.	do.	do.	do.	do.	do.	do.	do.	do.	Any 3 from A; psychology and any 2 from B; methods in special department, and paper.
Second-grade high school city-State certificate.	do.	do.	do.	1 year.....	do.	1 year.	do.	do.	Any 6 subjects from A, and 8 college hours above 4-year high-school course in department for which certificate is desired; psychology and school management; methods in special subjects, and paper.
Second-grade grammar city-State certificate.	do.	do.	do.	do.	do.	do.	do.	do.	Any 1 subject from A; psychology and school management; grammar methods.
Second-grade primary city-State certificate.	do.	do.	do.	do.	do.	do.	do.	do.	Psychology; primary methods.
Second-grade kindergarten city-State certificate.	do.	do.	do.	do.	do.	do.	do.	do.	Psychology; kindergarten methods.
Second-grade special supervisors city-State certificate.	do.	do.	do.	do.	do.	do.	do.	do.	Psychology; methods in special department.
First-grade county certificate.	County superintendent.	County	Common-school districts and grades of high-school districts.	2 to 3 years.....	do.	1 year or 12 weeks' normal training.	do.	do.	Same as second-grade county certificate with examination in algebra, botany, geometry, and physics; or graduation from standard college, university, or State normal school.

Second-grade county certificate.	...do....	...do....	1 to 2 years.	1 year or 8 weeks' normal training.	...do....	...do....	Same as third-grade county certificate, with examination in civil government, bookkeeping, drawing, theory and art of teaching, and elementary agriculture.
Third-grade county certificate.	...do....	...do....	Not over 1 year.	None.	...do....	...do....	Examination in orthography, reading, penmanship, geography, arithmetic, mental arithmetic, physiology and hygiene, English composition, English grammar, and United States history.
Emergency certificate.	State superintendent.	Specified district in specified county.	Specified term.	Same as second or third grade.	...do....	...do....	Evidences of ample scholarship. Teachers to take examinations as required by superintendent. Used only in sparsely settled regions in case of scarcity of teachers.

NOTE 1.—All classes of professional, first-grade, and second-grade city and State certificates are issued also on the completion of prescribed courses of study in standard normal schools and colleges in Nebraska, with signatures of the authorities of the institution and the State superintendent. The standard normal-school certificate represents two full years of college and professional training.

NOTE 2.—The general first and second grade State certificates are not included in the outline, because these are issued only by the standard normal schools and colleges on the completion of prescribed courses of study. These certificates are not valid in city districts, but may be accepted as credentials toward city State, first-grade city State, professional State and professional city State certificates mark a natural gradation in the scheme of certification, making it possible, by easy steps, to go from the lowest county certificate to the highest professional city State certificate.

NOTE 3.—Tradition.—Third-grade county, second-grade county, first-grade county, second-grade city State, first-grade city State, first-grade State, and first-grade city State certificates may be reissued when the holder makes progress, by examination or otherwise, toward the next higher certificate.

NOTE 4.—The first and second grade county certificates may be reissued when the holder makes progress, by examination or otherwise, toward the next higher certificate. Successful teaching in Nebraska, and a Nebraska first-grade county certificate.

NOTE 5.—A graduate of a standard college or university may receive a general professional life certificate or a city State professional certificate on evidence of three years' successful teaching in Nebraska, and a Nebraska first-grade county certificate.

NOTE 6.—The rules and regulations of the conference of chief school officers on reciprocal relations between States on the certification of teachers are in force in this State. Credentials from standard normal schools and colleges from other States are given practically the same value as credentials submitted from Nebraska institutions.

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STATISTICS OF STATE UNIVERSITIES AND
OTHER INSTITUTIONS OF HIGHER
EDUCATION PARTIALLY SUP-
PORTED BY THE STATE

FOR THE YEAR ENDED
JUNE 30, 1911



WASHINGTON
GOVERNMENT PRINTING OFFICE
1912

STATISTICS OF STATE UNIVERSITIES AND OTHER INSTITUTIONS OF HIGHER EDUCATION PARTIALLY SUPPORTED BY THE STATE, FOR THE YEAR ENDED JUNE 30, 1911.

This annual bulletin, formerly prepared and published by the National Association of State Universities, has been published by the Bureau of Education for the past three years. The data given are taken from reports received from the offices of the presidents of the various institutions, and the figures printed are substantially as given in those reports. Apparent errors have been called to the attention of the authorities making the report and opportunity given for correction. In the preparation of these bulletins the bureau makes no investigation, but simply tabulates the returns as reported by the several institutions.

CHANGES IN COURSES AND METHODS OF INSTRUCTION.

University of Arizona.—In addition to the two-year short course previously offered, four-year courses are now offered in agronomy, horticulture, and animal husbandry.

Colorado State Agricultural College.—A course in mechanic arts parallel to the work in agriculture is now given in the school of agriculture, a secondary school maintained by the college.

University of Colorado.—The Denver and Gross College of Medicine has been united with the university medical school. The last two years' work in the medical school is now given in Denver. A course in pharmacy was added in September, 1911; and the entrance requirements to the law school were increased to the equivalent of two years' college work.

Connecticut Agricultural College.—Two four-year courses in agriculture are now given, a diploma course requiring the completion of two years of high-school work for entrance and a degree course requiring four years of high-school work for entrance. Two-year courses in agriculture and in home economics are offered to students having the equivalent of a common-school education.

University of Florida.—A one-year short course in agriculture and a four weeks' short course for farmers have been introduced. The scope of the corresponding courses in agriculture has been increased.

University of Idaho.—"High-school courses in agriculture, domestic economy, commerce, and the industrial arts will be accepted in fulfillment of the entrance requirements of all the colleges of the university on a par with the most favored subject of the high-school curricula."

Purdue University (Indiana).—A department of agricultural extension has been established in the university by legislative enactment. Under the terms of the enactment the new department includes the administration of farmers' institutes. The annual appropriation for this department is \$30,000. The university has been accepted by the Carnegie Foundation for the Advancement of Teaching as eligible to benefits of retiring allowances for professors.

Iowa State College of Agriculture and Mechanic Arts.—A department of agricultural education offering a four-year course, intended to fit men for special teachers of agriculture, has been established. The course contains largely prescribed subjects with work in agriculture, general education, and in special methods of teaching agriculture in secondary schools.

Massachusetts Agricultural College.—The board of trustees at their annual meeting in June, 1911, adopted a general plan of department and division organization. The departments of instruction include now divisions of agriculture, horticulture, science, humanities, rural social science, and physical training.

University of Minnesota.—The four-year course in engineering has been discontinued and replaced by a five-year course leading to the engineering degree. Classes are now in operation in the freshman, sophomore, and junior years of the new five-year course. The courses in the college of agriculture have within the past year been enlarged to include a special six weeks' course equivalent to one semester's work on the basis of college credit for the special assistance of those who desire to teach agriculture and mechanic arts.

University of Missouri.—The entrance requirements for all divisions of the university except the college of arts and science and the college of agriculture have been raised to include two years of college work. Chairs of preventive medicine, forestry, and poultry husbandry have been established.

Mississippi Agricultural and Mechanical College.—A school of industrial education has been established for the purpose of preparing teachers of agriculture and manual training. All pedagogical departments of the institution are now included in the school of industrial education; also the preparatory department, which is now used as a practice school for advanced students preparing to teach.

Montana College of Agriculture and Mechanic Arts.—A secretarial course, chiefly for women, has been established. The course extends through four years and leads to the degree of bachelor of science.

University of Nevada.—A college of education leading to the degree of bachelor of science has been established.

University of New Mexico.—The requirements for admission to the preparatory department have been raised to include a minimum of two years of high-school work. A summer school for high-school

teachers was conducted during the past summer. Extension courses were inaugurated in Albuquerque and Santa Fe.

Ohio State University.—A department of agricultural education has been added to the school of education, offering courses in agricultural pedagogy, including methods of teaching secondary agriculture. This department proposes to aid teachers actively engaged in teaching agriculture throughout the State, wherever their aid may be desired.

Oklahoma Agricultural and Mechanical College.—Students to enter the business courses in the future must be at least 18 years of age. Students to enter the preparatory department of the college must be at least 16 years of age if they come from towns which support high schools.

Oregon Agricultural College.—A chair in highway engineering and a chair in rural economics have been established.

University of Oregon.—The entrance requirements to the school of medicine at Portland have been raised to include one year of college work.

University of Porto Rico.—The entrance requirements to the college of agriculture have been raised to include the completion of the eighth grade.

Rhode Island State College.—The requirements for admission have been raised by one unit, making the entrance requirements to all courses 14 units of standard high-school work.

University of Tennessee.—During the past year the requirements for admission were advanced from 12 to 14 units in the college of liberal arts and from 11 to 12 units in the colleges of engineering and agriculture. For entrance into the school of law and medicine 14 units are required. A prescribed four-year course in agricultural education is now given by the school of education, the work including mechanical courses in agriculture, courses in education, and in educational pedagogy.

Agricultural College of Utah.—Three years of high-school work are now required for admission to the college course. A school of agricultural engineering has been established which includes courses in irrigation and drainage, road building, rural surveying, construction of farm buildings, and the operation of farm machinery.

University of Utah.—The law now provides that 400 scholarships shall be maintained in the school of education, not more than 200 of which shall be in the secondary training school. The school of education is the State normal school.

University of Washington.—Twenty-three instructors have been added to the faculty. A course in library science has been established. Provision has been made for a course in music leading to the degree of bachelor of music. Twelve credits in music have been

allowed toward the degree of bachelor of arts. An endowment of \$30,000 has been provided to establish a bureau of child welfare.

University of West Virginia.—The preparatory school of the university is being gradually abolished. Nine units of high-school work are now required for entrance to the preparatory school.

GIFTS, BUILDINGS, AND IMPROVEMENTS.

Alabama Polytechnic Institute.—A new engineering building to be known as the William LeRoy Brown Engineering Hall has been completed and furnished.

University of Arizona.—Farm buildings costing \$2,000 and a water system costing \$1,000 have been completed during the year.

Colorado State Agricultural College.—The Simon Guggenheim hall of useful arts, a gift from United States Senator Simon Guggenheim, has been completed at a cost of \$50,000.

University of Colorado.—A science building costing \$55,000 has been completed, and an auditorium to cost \$300,000 is in process of erection.

Delaware College.—New farm buildings have been erected, and alterations in the college buildings to provide facilities for a laboratory for agricultural and horticultural purposes have been made during the year at a total cost for both purposes of \$8,500.

University of Florida.—The sum of \$40,000 has been expended in the erection of an engineering building.

University of Georgia.—A farm barn and a veterinary hospital, costing together \$65,000, have been erected.

College of Hawaii.—A dairy building containing a cattle barn, a laboratory, and a feed room has been constructed at a cost of \$2,600.

University of Idaho.—An auditorium wing to the administration building is under construction, to cost \$85,000. A dairy barn and a stock-judging pavilion, also under construction, will cost \$9,500.

University of Illinois.—The State legislature has appropriated the sum of \$3,519,300 for the support of the university for the next two years, and it has made provision for the future by levying a 1-mill tax for its continued support. This tax should allow the university two years hence about \$2,250,000 a year. During the next two years \$724,000 is available for new buildings. Of this amount, \$200,000 is to be expended for an engineering building and grounds; \$153,000 for agricultural building; \$125,000 for a women's building, and \$100,000 for an armory. For maintenance and support of the college of engineering \$180,000 has been allotted for the biennium, and for the college of agriculture and the agricultural experiment station \$800,000.

Purdue University (Indiana).—Apparatus and equipment costing \$40,000 has been secured for the new mechanic arts building.

Iowa State Teachers College.—A library building has been completed during the year, costing \$175,000.

University of Kansas.—An addition has been completed to the administration building, costing \$125,000. The new portion is to be used for general recitation purposes. A hospital has been erected at a cost of \$50,000, located at Rosedale.

Kansas Agricultural College.—An armory and gymnasium building has just been completed. The cost of the building and equipment was \$122,000.

Massachusetts Agricultural College.—A new laboratory for entomology and zoology was completed and dedicated November 11, 1910. The cost of the building and equipment was \$95,000. A stock-judging pavilion costing \$10,000 and a pomology building costing \$12,000 have been completed during the year.

Massachusetts Institute of Technology.—The institute has received under the will of Mrs. Emma Rogers, widow of a former president of the institution, the residue of her estate, valued at about \$410,000; from T. C. DuPont \$500,000, and from Francis B. Greene a trust fund amounting to \$500,000, granted for the assistance of students.

Michigan Agricultural College.—A chemistry building 63 by 74 feet, two stories in height, has been completed. It is of reenforced concrete construction and cost about \$22,000.

University of Minnesota.—The following buildings have been erected during the past year, or are now in process of erection: Women's dormitory, costing \$50,000; mechanic arts building for the college of agriculture, with equipment, costing \$260,000; an administration building, containing the library and auditorium, costing \$200,000; and an experimental engineering building, with equipment, costing \$25,000. Expenditures for an enlarged campus, amounting to \$184,000, have been made during the year.

Mississippi Agricultural and Mechanical College.—The expenditures for buildings during the past year include \$15,000 for completing and equipping a new dormitory erected in 1908, \$6,000 for building the new chemical laboratory, and \$17,000 for completing and furnishing the chapel.

University of Missouri.—A veterinary building costing \$32,500 and an addition to the ore-dressing laboratory costing \$18,000 have been completed during the year.

Montana School of Mines.—A \$15,000 gymnasium building is in process of erection.

Montana College of Agriculture.—Buildings just completed or under process of construction include a greenhouse, costing \$10,000; farm machinery building, \$4,000; civil and electrical engineering building, \$60,000.

University of Nevada.—A building for electrical engineering, to cost \$40,000, is in process of erection.

Rutgers College (New Jersey).—A chemistry building, begun last year, was opened for use in May, 1911. For the equipment of an entomological building and the physics laboratory \$10,000 is available.

Cornell University (New York).—A new dormitory, to accommodate 175 women students, is in process of erection. The site of this building was purchased by means of a gift of \$20,000 from Mr. Emerson McMillan, of New York. For the building itself Mrs. Russell Sage donated \$300,000. A new building for a department of domestic science, to cost \$154,000, and one for the department of poultry husbandry, to cost \$90,000, and a new barn, to cost \$20,000, are in course of construction. Plans are completed for a \$50,000 heating plant; an auditorium, to cost \$138,000; and a new veterinary college hospital, to cost \$140,000. For these buildings and others in process of erection the university will spend \$1,052,000. The institution has received in gifts during the past year \$629,613.

North Carolina College of Agriculture and Mechanic Arts.—A dormitory, costing \$32,000, has been completed during the past year. An animal-husbandry building, to cost \$30,000, and a dining hall, which will accommodate 750 students and will cost \$37,000, are in process of erection.

Ohio State University.—A new library, to cost about \$100,000, is under process of construction.

University of Oklahoma.—An appropriation of \$125,000 for a law building is available. Work has not yet been started.

Oklahoma Agricultural and Mechanical College.—New buildings completed during the past year include a dairy barn, costing \$1,000; veterinary hospital, \$2,500; sheep barn, \$1,500; greenhouse, \$5,000; a central heating plant, \$40,000; a boys' dormitory, \$25,000; and a girls' dormitory, \$65,000. The girls' dormitory building contains classrooms and laboratories for domestic science and domestic arts. The last legislature has made provision for a library and chapel building, to cost \$84,000; an engineering building, to cost \$75,000; and for additions to present buildings, \$12,000.

Oregon Agricultural College.—The 1911 State legislature increased the State appropriation for maintenance or current expenses from \$80,000 to \$150,000 per year; provided \$60,000 for equipment, \$133,500 for buildings, \$15,000 for books for the library, \$25,000 for improvements, and \$15,000 for general repairs.

University of Porto Rico.—A library building to cost \$10,000 is being constructed. To complete the manual-training shop and for equipment, \$6,000 has been expended. A new poultry building has been completed, costing \$1,000.

Rhode Island State College.—The sum of \$2,750 has been paid for an athletic field and for the erection of dressing quarters on the field.

Clemson College (South Carolina).—The new building operations include a model dairy building, \$20,000; dairy barns, \$15,000; dormitories, \$28,000.

University of South Carolina.—A total of \$25,000 has been expended on a new science building, a heating plant, and for apparatus and equipment.

University of South Dakota.—A new library has been completed at a cost of \$47,500.

University of Tennessee.—A new library building, costing \$56,000, has been completed. Mr. Andrew Carnegie contributed \$40,000 for this building.

Agricultural College of Utah.—A gymnasium, to cost \$60,000, for men and women is under construction.

University of West Virginia.—For providing additions to several of the instructional and laboratory buildings \$50,000 has been expended.

University of Wisconsin.—The total expenditure for new buildings during the year was \$161,191.50. Of this amount, \$59,937 was expended for a biology building, \$22,538 for a horticultural building, \$31,738 on a building for a shop and store, and \$20,522 on an addition to the engineering building.

Directory of State universities and other State-aided institutions of higher education.

[Names in *italics* are institutions endowed by Federal Government under Morrill Acts.]

Location.	Name.	President.
1 Auburn, Ala.	<i>Alabama Polytechnic Institute</i>	Charles C. Thach, LL. D.
2 University, Ala.	University of Alabama	George H. Denny, LL. D.
3 Tucson, Ariz.	<i>University of Arizona</i>	Arthur H. Wilde, Ph. D.
4 Fayetteville, Ark.	<i>University of Arkansas</i>	John N. Tillman, LL. D.
5 Berkeley, Cal.	<i>University of California</i>	Benj. Ide Wheeler, LL. D.
6 Boulder, Colo.	University of Colorado	James H. Baker, LL. D.
7 Fort Collins, Colo.	<i>State Agricultural College (Colo.)</i>	Chas. A. Lory, M. S.
8 Golden, Colo.	Colorado School of Mines	Victor C. Alderson, Sc. D.
9 Storrs, Conn.	<i>Connecticut Agricultural College</i>	C. H. Beach, B. S.
10 Newark, Del.	<i>Delaware College</i>	Geo. A. Harter, Ph. D.
11 Gainesville, Fla.	<i>University of Florida</i>	Albert A. Murphree, LL. D.
12 Tallahassee, Fla.	Florida State College for Women	Edward Conradi, Ph. D.
13 Athens, Ga.	<i>University of Georgia</i>	David C. Barrow, LL. D., chancellor.
14 Atlanta, Ga.	Georgia School of Technology	Kenneth G. Matheson, LL. D.
15 Dahlonega, Ga.	North Georgia Agricultural College	G. R. Glenn, LL. D.
16 Honolulu, Hawaii.	<i>College of Hawaii</i>	John G. Gilmore, M. S. A.
17 Moscow, Idaho.	<i>University of Idaho</i>	James A. MacLean, LL. D.
18 Urbana, Ill.	<i>University of Illinois</i>	Edmund J. James, LL. D.
19 Bloomington, Ind.	Indiana University	William L. Bryan, LL. D.
20 Lafayette, Ind.	<i>Purdue University (Ind.)</i>	W. E. Stone, LL. D.
21 Ames, Iowa.	<i>Iowa State College of Agriculture and Mechanic Arts</i>	E. W. Stanton, LL. D., acting.
22 Cedar Falls, Iowa.	Iowa State Teachers' College	Homer H. Seerley, LL. D.
23 Iowa City, Iowa.	State University of Iowa	John G. Bowman, M. A.
24 Lawrence, Kans.	University of Kansas	Frank Strong, LL. D.
25 Manhattan, Kans.	<i>Kansas State Agricultural College</i>	Henry J. Waters, B. S. A.
26 Lexington, Ky.	<i>State University (Ky.)</i>	Henry S. Barker, LL. D.
27 Baton Rouge, La.	<i>Louisiana State University and Agricultural and Mechanical College</i>	Thomas D. Boyd, LL. D.
28 Orono, Me.	<i>University of Maine</i>	Richard J. Aley, LL. D.
29 College Park, Md.	<i>Maryland Agricultural College</i>	R. W. Silvester, LL. D.
30 Amherst, Mass.	<i>Massachusetts Agricultural College</i>	K. L. Butterfield, LL. D.
31 Boston, Mass.	<i>Massachusetts Institute of Technology</i>	Richard C. Maclaurin, LL. D.

Directory of State universities and other State-aided institutions of higher education—
Continued.

	Location.	Name.	President.
32	Ann Arbor, Mich.....	University of Michigan.....	Harry B. Hutchins, LL. D.
33	East Lansing, Mich.....	<i>Michigan Agricultural College</i>	J. L. Snyder, LL. D.
34	Houghton, Mich.....	Michigan College of Mines.....	F. W. McNair, Sc. D.
35	Minneapolis, Minn.....	<i>University of Minnesota</i>	George E. Vincent, LL. D.
36	Agricultural College, Miss.	<i>Mississippi Agricultural and Mechanical College</i>	J. C. Hardy, LL. D.
37	University, Mich.....	University of Mississippi.....	A. A. Kincannon, LL. D., chancellor.
38	Columbia, Mo.....	<i>University of Missouri</i>	Albert Ross Hill, LL. D.
39	Bozeman, Mont.....	<i>Montana College of Agricultural and Mechanic Arts</i>	James M. Hamilton, M. S.
40	Butte, Mont.....	Montana State School of Mines.....	Charles H. Bowman, M. S.
41	Missoula, Mont.....	University of Montana.....	C. A. Duniway, Ph. D.
42	Lincoln, Nebr.....	<i>University of Nebraska</i>	Samuel Avery, LL. D., chancellor.
43	Reno, Nev.....	<i>University of Nevada</i>	J. E. Stubbs, LL. D.
44	Durham, N. H.....	<i>New Hampshire College of Agriculture and Mechanic Arts</i>	W. D. Gibbs, Sc. D.
45	New Brunswick, N. J.....	<i>Rutgers College (N. J.)</i>	Wm. H. S. Demarest, LL. D.
46	Agricultural College, N. Mex.	<i>New Mexico College of Agriculture and Mechanic Arts</i>	W. E. Garrison, Ph. D.
47	Albuquerque, N. Mex.....	University of New Mexico.....	Edward McQueen Gray, Ph. D.
48	Socorro, N. Mex.....	New Mexico School of Mines.....	Emmet A. Drake, M. A.
49	Ithaca, N. Y.....	<i>Cornell University (N. Y.)</i>	J. G. Schurman, LL. D.
50	Chapel Hill, N. C.....	University of North Carolina.....	F. P. Venable, LL. D.
51	West Raleigh, N. C.....	<i>North Carolina College of Agriculture and Mechanic Arts</i>	Daniel H. Hill, Litt. D.
52	Agricultural College, N. Dak.	<i>North Dakota Agricultural College</i>	J. H. Worst, LL. D.
53	University, N. Dak.....	State University and School of Mines (N. Dak.).....	Frank L. McVey, Ph. D.
54	Athens, Ohio.....	Ohio University.....	Alston Ellis, LL. D.
55	Columbus, Ohio.....	<i>Ohio State University</i>	Rev. W. O. Thompson, LL. D.
56	Oxford, Ohio.....	Miami University (Ohio).....	R. W. Hughes, acting.
57	Norman, Okla.....	University of Oklahoma.....	Julien C. Monnet, acting.
58	Stillwater, Okla.....	<i>Oklahoma Agricultural and Mechanical College</i>	J. H. Connell, M. S.
59	Corvallis, Oreg.....	<i>Oregon State Agricultural College</i>	W. J. Kerr, Sc. D.
60	Eugene, Oreg.....	University of Oregon.....	Prince L. Campbell, A. B.
61	State College, Pa.....	<i>Pennsylvania State College</i>	Edwin E. Sparks, LL. D.
62	Rio Piedras, P. R.....	<i>University of Porto Rico</i>	Edwin G. Dexter, Ph. D.
63	Kingston, R. I.....	<i>Rhode Island State College</i>	Howard Edwards, LL. D.
64	Charleston, S. C.....	South Carolina Military Academy.....	Col. O. J. Bond, A. M., supt.
65	Clemson, S. C.....	<i>Clemson Agricultural College (S. C.)</i>	Walter M. Riggs, E. M. E.
66	Columbia, S. C.....	University of South Carolina.....	S. C. Mitchell, LL. D.
67	Brookings, S. Dak.....	<i>South Dakota Agricultural College</i>	Robert L. Slagle, Ph. D.
68	Rapid City, S. Dak.....	South Dakota State School of Mines.....	Charles H. Fulton, E. M.
69	Vermilion, S. Dak.....	University of South Dakota.....	Franklin B. Gault, Ph. D.
70	Knoxville, Tenn.....	<i>University of Tennessee</i>	Brown Ayres, LL. D.
71	Austin, Tex.....	University of Texas.....	Sidney E. Mezes, Ph. D.
72	College Station, Tex.....	<i>Agricultural and Mechanical College of Texas</i>	Robert T. Milner.
73	Logan, Utah.....	<i>Agricultural College of Utah</i>	John A. Widtsoe, Ph. D.
74	Salt Lake City, Utah.....	University of Utah.....	Joseph T. Kingsbury, Sc. D.
75	Burlington, Vt.....	<i>University of Vermont and State Agricultural College</i>	Guy P. Benton, LL. D.
76	Blacksburg, Va.....	<i>Virginia Polytechnic Institute</i>	P. B. Barringer, LL. D.
77	Charlottesville, Va.....	University of Virginia.....	E. A. Alderman, LL. D.
78	Lexington, Va.....	Virginia Military Institute.....	Edward W. Nichols, supt.
79	Williamsburg, Va.....	College of William and Mary (Va.).....	L. G. Tyler, LL. D.
80	Pullman, Wash.....	<i>State College of Washington</i>	E. A. Bryan, LL. D.
81	Seattle, Wash.....	University of Washington.....	Thomas F. Kane, Ph. D.
82	Morgantown, W. Va.....	<i>West Virginia University</i>	Thomas E. Hodges, Ph. D.
83	Madison, Wis.....	<i>University of Wisconsin</i>	Charles R. Van Hise, LL. D.
84	Laramie, Wyo.....	<i>University of Wyoming</i>	Charles O. Merica, LL. D.

Agricultural and mechanical colleges for colored students.

1	Normal, Ala.....	<i>Agricultural and Mechanical College for Negroes</i>	Walter S. Buchanan.
2	Pine Bluff, Ark.....	<i>Branch Normal College</i>	W. S. Harris.
3	Dover, Del.....	<i>State College for Colored Students</i>	W. C. Jason, A. M.
4	Tallahassee, Fla.....	<i>Florida Agricultural and Mechanical College for Negroes</i>	N. B. Young, A. M.
5	Savannah, Ga.....	<i>Georgia State Industrial College</i>	R. R. Wright, LL. D.
6	Frankfort, Ky.....	<i>Kentucky Normal and Industrial Institute for Colored Persons</i>	James S. Hathaway.
7	New Orleans, La.....	<i>Southern University</i>	H. A. Hill.
8	Princess Anne, Md.....	<i>Princess Anne Academy</i>	J. O. Spencer, Ph. D.

Agricultural and mechanical colleges for colored students—Continued.

	Location.	Name.	President.
9	Alcorn, Miss.....	<i>Alcorn Agricultural and Mechanical College.</i>	J. A. Martin, A. M.
10	Jefferson City, Mo.....	<i>Lincoln Institute.</i>	B. F. Allen, Ph. D.
11	Greensboro, N. C.....	<i>Agricultural and Mechanical College for the Colored Race.</i>	James B. Dudley, LL. D.
12	Langston, Okla.....	<i>Colored Agricultural and Normal University.</i>	Inman E. Page, A. M.
13	Orangeburg, S. C.....	<i>Colored Normal, Industrial, Agricultural, and Mechanical College.</i>	Robert S. Wilkinson, Ph. D.
14	Prairie View, Tex.....	<i>Prairie View State Normal and Industrial College.</i>	E. L. Blackshear.
15	Hampton, Va.....	<i>Hampton Normal and Agricultural Institute.</i>	H. B. Frissell, D. D.
16	Institute, W. Va.....	<i>West Virginia Colored Institute.</i>	Byrd Prillerman, A. M.

TABLE 1.—The teaching force in State universities

				Professors and instructors.			President's salary.	Maximum and minimum salaries.	
Names of institutions.	Preparatory department.	Collegiate department.	Professional departments.	Total (excluding duplicates).				Deans.	
				Men.	Women.	Total.		Maximum.	Minimum.
1	2	3	4	5	6	7	8	9	10
1 Alabama Polytechnic Institute.....	0	61	9	61	0	61	\$3,600	\$2,400	\$2,400
2 University of Alabama.....	0	36	28	64	0	64	4,000	2,800	2,400
3 University of Arizona.....	7	25	0	23	9	32	4,000		
4 University of Arkansas.....	5	73	43	117	14	131	4,000		
5 University of California.....	0	269	145	406	15	421	12,000	4,500	1,000
6 University of Colorado.....	0	77	97	153	15	168	5,000	3,000	3,000
7 State Agricultural College (Colo.).....	30	55	0	55	11	66			
8 Colorado School of Mines.....	0	21	0	21	0	21	5,500		
9 Connecticut Agricultural College.....	9	23	0	18	5	23	4,000	3,000	3,000
10 Delaware College.....	0	24	0	23	1	24	3,000		
11 University of Florida.....	4	27	3	34	0	34	3,300	2,300	1,900
12 Florida State College for Women.....	17	18	0	11	16	27	3,000	2,000	1,800
13 University of Georgia.....	0	45	6	51	0	51	5,000		
14 Georgia School of Technology.....	0	59	0	57	2	59	6,000	2,500	2,500
15 North Georgia Agricultural College.....	2	12	0	13	1	14	2,600		
16 College of Hawaii.....	0	17	0	14	3	17	4,800		
17 University of Idaho.....	8	58	9	51	10	61	4,500	3,500	2,200
18 University of Illinois.....	18	400	212	530	85	615	10,000	5,000	3,750
19 Indiana University.....	0	81	199	252	11	263	5,000		
20 Purdue University (Ind.).....	0	158	0	150	8	158	6,000	4,000	2,500
21 Iowa State College of Agriculture and Mechanic Arts.....	0	154	0	118	36	154	5,000	4,000	2,000
22 Iowa State Teachers College.....	0	104	0	43	61	104	6,000	2,100	1,600
23 State University of Iowa.....	0	140	162	183	11	193	6,000	5,000	1,600
24 University of Kansas.....	0	119	119	111	28	139	6,000	3,000	2,600
25 Kansas State Agricultural College.....	15	109	7	95	36	131	6,000	3,000	2,000
26 State University (Ky.).....	6	70	6	77	5	82	5,500	3,000	2,000
27 Louisiana State University and Agricultural and Mechanical College.....	7	70	4	68	12	80			
28 University of Maine.....	0	67	12	89	9	98	5,000	2,800	2,400
29 Maryland Agricultural College.....	7	23	0	23	0	23	3,000	1,800	1,800
30 Massachusetts Agricultural College.....	0	42	0	41	1	42	5,000	3,000	3,000
31 Massachusetts Institute of Technology.....	0	230	0	229	1	230			
32 University of Michigan.....						311	8,500	5,000	1,800
33 Michigan State Agricultural College.....		115	3	95	20	115	5,000	3,000	1,700
34 Michigan College of Mines.....	0	28	0	28	0	28			
35 University of Minnesota.....	44	181	71	269	27	296	10,000	6,000	2,500
36 Mississippi Agricultural and Mechanical College.....	6	46	0	66		66	3,500	2,500	2,500
37 University of Mississippi.....	0	29	11	39	1	40	5,000	2,500	2,500
38 University of Missouri.....		145	28	163	10	173	7,500	4,000	3,300
39 Montana College of Agriculture and Mechanic Arts.....	13	39		33	9	42			
40 Montana State School of Mines.....		7	0	7	0	7	3,500		
41 University of Montana.....		27	0	26	6	32	4,500		
42 University of Nebraska.....	0	150	93	246	87	333	6,000	3,000	2,000
43 University of Nevada.....	16	35	0	32	10	42	4,500		
44 New Hampshire College of Agriculture and Mechanic Arts.....	0	38	0	35	3	38	4,000	2,200	2,200
45 Rutgers College (N. J.).....	12	47	0	52	6	58	6,000	3,000	3,000
46 New Mexico College of Agriculture and Mechanic Arts.....	3	40	0	36	7	43	4,500	3,000	3,000
47 University of New Mexico.....	3	21	0	13	10	23	2,400	1,950	1,950
48 New Mexico School of Mines.....	1	7	0	8	0	8	3,000	1,700	1,700
49 Cornell University (N. Y.).....	0	466	183	631	21	652	10,000	6,000	3,700
50 University of North Carolina.....	0	44	31	56	0	56	4,000	2,500	2,500
51 North Carolina College of Agriculture and Mechanic Arts.....	0	48	4	48	0	48	3,500	2,550	2,550
52 North Dakota Agricultural College.....	61	55	6	69	11	80	5,400	3,500	1,800
53 State University and School of Mines (N. Dak.).....	0	65	7	59	6	65	6,000	3,300	3,000
54 Ohio University.....	23	39	0	41	31	72	5,000	3,000	3,000
55 Ohio State University.....	0	245	22	241	26	267	7,000	5,000	2,500
56 Miami University (Ohio).....	0	30	0	29	1	30	5,000	3,000	3,000
57 University of Oklahoma.....	2	56	45	81	11	92	4,000	4,000	1,750

and other State-aided institutions of higher education.

Maximum and minimum salaries—Continued.												Houses in addition to salaries.	
Professors.		Associate professors.		Assistant professors.		Adjunct professors.		Instructors.		Tutors and others.			
Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	President.	Professors.
11	12	13	14	15	16	17	18	19	20	21	22	23	24
\$2,400	\$2,600	\$2,000	\$1,600	\$2,000	\$1,600	\$2,000	\$1,600	\$1,400	\$900	\$900	\$250	No.	0
2,400	1,000	1,800	1,800	1,000	1,000	1,600	1,200	1,000	600	200	200	Yes.	2
2,400	1,800			1,600	1,400			1,400	1,000			Yes.	0
2,500	2,000	1,600	1,400	1,400	1,200	1,200	1,000	900	750	300	250	No.	0
4,000	2,000	2,700	2,100	2,200	1,300			1,500	900	1,500	500	Yes.	3
2,800	1,800			1,800	1,400			1,200	800	400	200	Yes.	0
													7
3,000	1,800			2,200	1,600			1,200	1,000			Yes.	0
2,500	1,000	1,600	1,500					1,700	750	300	150	No.	0
3,000	1,750			1,500	1,500			1,000	500			No.	0
1,800	1,500			1,500	1,200			800	400	100	100	No.	0
1,800	1,600			1,300	1,000			800	600			No.	0
3,200	2,000	1,800	1,800			1,500	1,500	1,200	900	600	600	Yes.	0
2,000	1,800			1,500	1,200			1,350	800	300	300	Yes.	0
1,500	1,500			1,200	1,200	1,000	1,000					No.	0
2,750	2,000			1,800	1,500			1,400	1,200				16
2,000	1,800	1,700	1,600	1,500	1,400							No.	0
5,000	2,500	2,750	2,100	2,500	1,320			2,100	800	1,200	400	Yes.	0
2,500	1,800	1,600	1,500	1,500	1,000			1,200	600				17
3,000	1,800	1,800	1,500					1,400	1,000	800	500	No.	1
3,400	1,800	2,100	1,200	2,000	950			1,800	600			Yes.	9
													21
2,000	1,300			1,200	1,000			1,200	450			Yes.	0
4,400	850			1,800	750			1,500	600	500	50	Yes.	0
2,500	2,200	2,100	1,500	1,500	1,200			1,000	500	280	250	Yes.	0
3,000	1,750	1,800	1,800	2,000	1,300			1,600	850	900	480	No.	0
2,000	1,500	1,800	1,400	1,400	1,000			1,000	600	500	100	No.	0
													27
2,400	1,500	1,800	1,500	1,500	1,200			1,400	600	500	200	Yes.	0
				1,000		800	800	500				No.	0
3,000	2,500	2,300	1,600	2,000	1,600			1,600	1,200	960	600	Yes.	0
													30
4,000	2,000	2,200	2,000	1,000	1,600			1,400	900	800	800	No.	0
3,000	1,000	1,600	1,600	1,500	1,400	1,200	1,200					Yes.	7
													33
3,500	2,000	3,200	3,000	2,400	1,500			1,500	800			No.	0
2,000	1,800	1,500	1,200	1,200	1,000			900	600	300	90	Yes.	27
													36
2,000		1,500		1,200				600		300		Yes.	3
3,300	1,400			2,000	1,500			2,000	600	1,000	300	No.	1
													38
													39
3,000		2,000	2,000					1,800	1,500	960		No.	0
2,250				1,800	1,200			1,350	1,000			No.	0
2,500	1,500	1,600	1,200	1,500	1,000	1,300	800	1,200	400	850	100	No.	0
2,400	2,400	2,100	1,600	1,800	1,500			1,500	1,200	600	300	No.	0
2,500	1,600	1,600	900	1,600	1,300			2,000	500	1,200	150	Yes.	0
													44
3,600	2,000	1,800	1,500					1,600	1,000	840	500	Yes.	0
2,100	1,000	1,650	1,250	1,400	1,200			1,200	500				46
1,800	1,800	1,400	1,200	1,200				1,000	450	1,000	150	No.	0
								1,200	1,000			No.	0
6,000	2,500			2,000	1,500			1,200	800	600	50	Yes.	2
2,500	2,000	1,600	1,000					1,500	500			Yes.	0
2,500	1,800	1,600	1,600	1,500	1,200			1,800	600			No.	0
													51
2,500	1,500			2,000	1,300			1,500	450	400	125	No.	0
3,000	2,500	2,500	2,000	2,000	1,400			1,500	800	500	500	Yes.	0
													53
2,500	2,000			1,500	1,000			1,000	800	1,000	600	No.	0
3,000	2,000	2,000	1,000	1,700	1,100			1,800	900	300	250	Yes.	0
2,300	2,000	1,700	1,500	1,500	1,200			1,200	850	800	400	Yes.	0
2,250	1,500	1,750	1,350	1,350	1,250			1,200	900			No.	0

TABLE 1.—*The teaching force in State universities*

				Professors and instructors.			President's salary.	Maximum and minimum salaries.	
Names of institutions.	Preparatory department.	Collegiate department.	Professional departments.	Total (excluding duplicates).				Deans.	
				Men.	Women.	Total.		Maximum.	Minimum.
1	2	3	4	5	6	7	8	9	10
58 Oklahoma Agricultural and Mechanical College.	7	48	0	45	10	55	\$4,500	\$2,200	\$2,200
59 Oregon State Agricultural College.....	0	95	0	74	21	95	5,000	2,500	2,200
60 University of Oregon.....	0	49	53	113	7	120	4,000	2,500	2,000
61 Pennsylvania State College.....	0	183	0	172	11	183	8,000	5,000	1,200
62 University of Porto Rico.....	11	33	0	18	26	44	.....	4,000	2,000
63 Rhode Island State College.....	0	29	0	23	6	29	4,000	3,600	3,600
64 South Carolina Military Academy.....	0	12	0	0	0	12	2,500	.....	.....
65 Clemson Agricultural College (S. C.).....	2	53	0	55	0	55	3,500	2,500	2,500
66 University of South Carolina.....	0	34	0	31	3	34	3,500	2,500	1,700
67 South Dakota Agricultural College.....	5	51	0	46	10	56	3,500	1,900	.....
68 South Dakota State School of Mines.....	2	10	0	12	0	12	2,800	.....	.....
69 University of South Dakota.....	13	36	16	38	16	54	4,000	2,750	1,920
70 University of Tennessee.....	8	64	86	127	9	136	4,500	2,300	2,300
71 University of Texas.....	0	74	27	99	8	107	5,000	4,000	3,000
72 Agricultural and Mechanical College of Texas.	9	68	0	68	0	68	4,000	2,700	2,700
73 Agricultural College of Utah.....	23	38	1	48	14	62	4,000	2,800	1,800
74 University of Utah.....	0	64	19	53	11	64	.....	.....	.....
75 University of Vermont and Agricultural College.	0	53	40	92	1	93	3,750	3,000	1,600
76 Virginia Polytechnic Institute.....	0	61	0	61	0	61	5,000	2,200	2,000
77 University of Virginia.....	0	47	26	74	0	74	8,000	1,300	1,250
78 Virginia Military Institute.....	0	19	0	19	0	19	4,000	.....	.....
79 College of William and Mary (Va.).....	9	11	0	20	0	20	2,760	2,000	2,000
80 State College of Washington.....	5	86	25	76	15	81	.....	.....	.....
81 University of Washington.....	0	93	10	99	4	103	5,000	2,700	1,500
82 West Virginia University.....	8	60	12	62	4	66	4,200	3,750	2,500
83 University of Wisconsin.....	0	464	22	438	48	486	7,000	4,500	3,750
84 University of Wyoming.....	13	32	0	33	12	45	5,000	.....	.....

¹ Additional to salary as a professor.

and other State-aided institutions of higher education—Continued.

Maximum and minimum salaries—Continued.												Houses in addition to salaries.	
Professors.		Associate professors.		Assistant professors.		Adjunct professors.		Instructors.		Tutors and others.			
Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	President.	Professors.
11	12	13	14	15	16	17	18	19	20	21	22	23	24
\$2,000	\$1,600	\$1,600	\$1,400	\$1,400	\$900	.....	.....	\$900	\$720	.....	.....	No.	0 58
2,400	1,500	2,000	1,800	1,800	1,400	.....	.....	1,500	800	.....	.....	No.	0 59
2,500	1,600	.....	.....	1,600	1,400	.....	.....	1,200	600	\$400	\$400	Yes.	0 60
3,000	1,600	2,000	1,500	2,100	1,000	.....	.....	1,200	750	1,000	650	Yes.	11 61
1,700	1,000	.....	.....	1,300	1,100	.....	.....	1,800	700	700	400	No.	1 62
2,350	1,500	.....	.....	1,300	1,100	.....	.....	1,500	150	.....	.....	No.	0 63
1,800	1,500	.....	.....	1,000	900	.....	.....	.....	.....	.....	.....	No.	0 64
1,900	1,900	1,900	1,700	1,500	1,500	.....	.....	1,200	800	.....	.....	Yes.	5 65
2,000	1,700	1,500	1,500	.....	.....	\$1,200	\$1,200	800	800	600	300	Yes.	15 66
2,700	1,200	1,400	1,300	.....	.....	.....	.....	1,200	600	.....	.....	Yes.	0 67
1,800	1,300	.....	.....	.....	.....	.....	.....	1,100	1,000	900	200	No.	1 68
1,800	1,420	.....	.....	1,200	1,000	.....	.....	900	600	300	120	No.	0 69
2,200	1,800	1,700	1,700	1,500	1,200	.....	.....	1,200	400	400	100	Yes.	0 70
3,000	2,500	2,500	2,000	.....	.....	2,000	1,800	1,800	900	900	500	No.	0 71
2,700	1,800	2,000	1,600	1,600	1,300	.....	.....	1,300	1,000	900	300	Yes.	6 72
2,200	1,700	1,350	1,350	1,600	1,300	.....	.....	1,500	100	800	100	Yes.	1 73
2,500	1,800	2,100	1,750	1,700	1,300	.....	.....	1,250	1,250	.....	.....	No.	0 74
2,200	1,500	.....	.....	2,000	1,350	1,150	200	1,200	75	300	75	Yes.	0 75
2,000	1,800	1,300	1,000	.....	.....	.....	.....	1,000	750	250	125	Yes.	1 76
3,200	2,000	2,500	2,000	.....	.....	1,500	1,200	1,000	100	.....	.....	Yes.	10 77
2,000	2,000	2,000	2,000	800	600	1,500	1,200	.....	.....	.....	.....	Yes.	12 78
1,800	1,800	.....	.....	1,200	900	.....	.....	700	400	.....	.....	Yes.	0 79
2,700	1,600	2,000	1,600	1,900	1,500	.....	.....	1,500	900	1,050	450	Yes.	3 80
2,500	2,200	2,000	2,000	1,800	1,600	.....	.....	2,200	900	.....	.....	Yes.	0 81
4,000	2,700	2,750	2,000	2,500	1,650	.....	.....	2,000	1,000	1,700	400	Yes.	5 82
2,200	2,000	1,800	1,500	1,500	1,500	.....	.....	1,400	800	.....	.....	No.	0 83

TABLE 2.—Student enrollment in State universities

Names of institutions.	Regular term of enrollment.										
	Preparatory department.		Collegiate department.		Graduate department.		Professional departments.		Total (excluding duplicates).		
	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Total.
1	2	3	4	5	6	7	8	9	10	11	12
1 Alabama Polytechnic Institute.	0	0	707	10	18	2	105	1	725	12	737
2 University of Alabama.	0	0	260	49	9	0	248	0	516	49	565
3 University of Arizona.	54	29	76	33	2	1	0	0	132	63	195
4 University of Arkansas.	111	55	499	194	7	2	186	1	617	251	868
5 University of California.	0	0	2,232	1,308	260	244	354	19	2,766	1,548	4,314
6 University of Colorado.	0	0	572	417	37	19	251	9	844	440	1,284
7 State Agricultural College (Colo.).	202	89	206	159					406	418	824
8 Colorado School of Mines.	0	0	342	0	0	0	0	0	342	0	342
9 Connecticut Agricultural College.	27	13	130	13	0	0	0	0	157	26	183
10 Delaware College.	0	0	157	0	2	0	0	0	159	0	159
11 University of Florida.	33	0	160	0	7	0	41	0	241	0	241
12 Florida State College for Women.	0	140	0	138	0	2	0	0	0	280	280
13 University of Georgia.	0	0	456	0	7	0	74	0	537	0	537
14 Georgia School of Technology	153	0	514	0	0	0	0	0	514	0	514
15 North Georgia Agricultural College.	84	12	86	36	0	0	0	0	170	48	218
16 College of Hawaii.	0	0	33	111	0	1	0	0	34	111	145
17 University of Idaho.	58	60	231	133	7	4	24	0	320	197	517
18 University of Illinois.	237	67	2,612	713	243	51	933	40	4,025	871	4,896
19 Indiana University.	0	0	1,065	629	94	46	281	97	1,440	682	2,122
20 Purdue University (Ind.)	0	0	1,435	104	98	4	74	1	1,607	109	1,716
21 Iowa State College of Agriculture and Mechanic Arts.	0	0	1,191	258	14	1	100	0	1,305	259	1,564
22 Iowa State Teachers' College.	0	0	244	1,180	0	0	0	0	244	1,180	1,424
23 State University of Iowa.	0	0	720	497	83	64	525	10	1,346	709	2,055
24 University of Kansas.	0	0	1,019	560	101	55	395	26	1,400	778	2,178
25 Kansas State Agricultural College.	283	81	952	575	14	20	61	0	1,272	632	1,904
26 State University (Ky.).	111	14	413	100	49	3	54	1	627	118	745
27 Louisiana State University and Agricultural and Mechanical College.	87	2	456	50	11	2	57	0	601	54	655
28 University of Maine.	0	0	499	39	39	3	75	0	768	90	858
29 Maryland Agricultural College.	61	0	109	0	6	0	0	0	176	0	176
30 Massachusetts Agricultural College.	0	0	416	3	14	1	0	0	430	4	434
31 Massachusetts Institute of Technology.	0	0	1,460	10	39	0	0	0	1,499	10	1,509
32 University of Michigan.	0	0	2,588	663	130	42	1,449	30	4,021	730	4,751
33 Michigan State Agricultural College.	116	19	891	216	6	1	0	0	1,332	236	1,568
34 Michigan College of Mines.	0	0	222	0	0	0	0	0	222	0	222
35 University of Minnesota.	1,251	378	1,540	1,193	88	43	888	41	3,967	1,655	5,622
36 Mississippi Agricultural and Mechanical College.	320	0	749	6	10	2	0	0	1,087	6	1,093
37 University of Mississippi.	0	0	272	52	19	6	146	3	420	60	480
38 University of Missouri.	0	0	1,546	667	92	37	203	12	2,109	632	2,741
39 Montana College of Agriculture and Mechanic Arts.	85	30	122	83	0	0	0	0	204	113	317
40 Montana State School of Mines.	0	0	59	1	0	0	0	0	59	1	60
41 University of Montana.	0	0	108	78	1	3	0	0	109	81	190
42 University of Nebraska.	0	0	1,123	1,030	94	75	441	13	1,586	1,253	2,839
43 University of Nevada.	49	50	112	100	1	5	0	0	161	150	311
44 New Hampshire College of Agriculture and Mechanic Arts.	0	0	190	17	1	0	0	0	191	17	208
45 Rutgers College (N. J.).	152	29	346	0	4	0	0	0	502	29	531
46 New Mexico College of Agriculture and Mechanic Arts.	104	50	48	18	2	0	0	0	154	68	222
47 University of New Mexico.	22	20	41	28	4	2	0	0	67	50	117
48 New Mexico School of Mines.	11	4	43	2	0	0	0	0	54	6	60
49 Cornell University (N. Y.).	0	0	3,186	356	308	64	535	28	3,984	428	4,412

and other State-aided institutions of higher education.

Enrolled only in summer school.		Enrolled in other short courses.		Enrollment by courses of study.								In professional departments.				
				Classical and general culture.	General science.	Engineering.	Agriculture and horticulture.	Forestry.	Household economy.	Training courses for teachers.	Law.	Medicine.	Dentistry.	Pharmacy.	Veterinary surgery.	
Men.	Women.	Men.	Women.	17	18	19	20	21	22	23	24	25	26	27	28	
0	0	0	0	0	49	315	227	22	0	0	0	0	0	55	51	1
75	167	0	0	157	74	75	0	0	0	0	80	154	0	14	0	2
9	0	0	0	38	28	33	10	0	0	0	0	0	0	0	0	3
27	71	0	0	417	0	236	30	0	0	95	80	106	0	3	0	4
421	630	118	5	1,323	609	786	280	0	0	0	141	82	64	85	0	5
81	105	0	0	0	0	0	0	0	0	0	108	152	0	0	0	6
0	0	114	110		8	85	20	3	49						34	7
0	342	0	0	0	0	342	0	0	0	0	0	0	0	0	0	8
27	87	46	10	0	0	13	118	0	12	0	0	0	0	0	0	9
0	0	4	0	15	15	111	16	0	0	2	0	0	0	0	0	10
0	0	0	0	37	17	40	30	0	0	25	41	0	0	0	0	11
0	0	0	0	70	0	0	0	0	20	190	0	0	0	0	0	12
0	0	0	0	184	179	43	97	62	0	0	55	0	0	19	0	13
0	0	0	0	0	0	514	0	0	0	0	0	0	0	0	0	14
0	0	0	0	142		22	20	0	0	34	0	0	0	0	0	15
0	0	0	0		132	9	2	0	0	0	0	0	0	0	0	16
0	0	10	0	107	39	90	48	19	40	0	24	0	0	0	0	17
463	214	0	0	604	248	1,064	630	0	175	0	157	518	140	158	0	18
388	349	0	0	1,065	629	0	0	0	0	440	0	106	0	0	0	19
0	0	148	21	0	1,212	164	18	46	59	0	0	0	0	75	0	20
0	0	146	3	0	84	576	310	34	149	0	0	0	0	0	100	21
134	1,140	0	0	0	0	0	0	0	0	1,424	0	0	0	0	0	22
157	190	0	0	1,037	0	172	0	0	0	275	211	118	145	43	0	23
202	186	0	0	1,144	0	435	0	50	188	244	99	0	0	78	0	24
5	24	315	159	0	147	347	411	0	474	0	0	0	0	0	61	25
0	0	58	0	84	57	290	83	0	14	54	55	0	0	0	0	26
244	308	122	9	184	0	120	56	0	0	47	57	0	0	0	0	27
103	51	63	1	74	15	301	58	37	6	2	75	0	0	0	0	28
0	0	107	44	7	7	73	26	0	0	0	0	0	0	0	0	29
75	154	107	7	0	0	0	419	0	0	0	0	0	0	0	0	30
0	0	0	0	0	2	891	0	0	0	0	0	0	0	0	0	31
973	264	0	0			1,286					792	359	238	90	0	32
0	0	319	2	0	0	440	382	0	216	0	0	0	0	0	0	33
0	0	0	0	0	0	222	0	0	0	0	0	0	0	0	0	34
126	189	215	72	1,529	149	537	107	113	69	94	442	191	206	90	0	35
0	0	0	0	0	0	257	307	0	0	107	0	0	0	0	0	36
47	334	0	0	76	183	32	0	0	0	95	69	49	0	31	0	37
306	291	298	1	1,056	14	577	356	0	19	191	228	47	0	0	0	38
0	0	113	0		30	58	39		30					11		39
0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	40
0	0	29	1	129	0	1	0	2	0	0	0	0	0	0	0	41
144	302	0	0	1,155	0	412	104	46	97	533	259	165	0	30	0	42
0	0	0	0	67	16	80	25	0	0	18	0	0	0	0	0	43
0	0	239	66	0	53	105	49	0	0	0	0	0	0	0	0	44
0	0	81	2	66	46	156	39	0	0	0	0	0	0	0	0	45
0	0	0	0		17	5	14		5							46
8	22	0	0													47
0	0	0	0	0	0	41	0	0	0	0	0	0	0	0	0	48
699	458	422	55	1,017	0	1,631	671	0	90	0	279	179	0	0	105	49

TABLE 2.—Student enrollment in State universities

Names of institutions.	Regular term of enrollment.										
	Preparatory department.		Collegiate department.		Graduate department.		Professional departments.		Total (excluding duplicates).		
	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Total.
1	2	3	4	5	6	7	8	9	10	11	12
50 University of North Carolina	0	0	579	5	24	2	193	0	781	7	788
51 North Carolina College of Agriculture and Mechanic Arts.	0	0	498	0	13	0	0	0	511	0	511
52 North Dakota Agricultural College.	306	154	115	100	3	0	29	2	453	256	709
53 State University and School of Mines (N. Dak.).	0	0	209	176	6	1	98	5	308	182	490
54 Ohio University.....	115	86	294	301	9	6	0	0	418	393	811
55 Ohio State University.....	0	0	1,747	627	50	20	436	5	2,224	652	2,876
56 Miami University (Ohio)....	0	0	247	106	2	0	0	0	247	106	353
57 University of Oklahoma.....	0	0	291	148	17	6	199	11	462	245	707
58 Oklahoma Agricultural and Mechanical College.	162	51	449	212	3	0	0	0	614	263	877
59 Oregon State Agricultural College.	0	0	510	199	12	3	38	9	705	265	970
60 University of Oregon.....	0	0	369	283	6	3	250	9	625	295	920
61 Pennsylvania State College..	0	0	1,349	32	0	0	0	0	1,349	32	1,381
62 University of Porto Rico.....	122	256	85	132	0	0	0	0	207	388	595
63 Rhode Island State College...	0	0	133	26	2	1	0	0	152	31	183
64 South Carolina Military Academy.	0	0	256	0	0	0	0	0	256	0	256
65 Clemson Agricultural College (S. C.).	80	0	604	0	0	0	0	0	684	0	684
66 University of South Carolina.	329	14	0	0	14	15	48	0	387	29	416
67 South Dakota Agricultural College.	178	61	131	57	3	2	0	0	310	120	430
68 South Dakota State School Mines.	20	6	41	0	0	0	0	0	61	6	67
69 University of South Dakota...	21	16	107	117	7	10	87	2	255	170	425
70 University of Tennessee.....	49	78	326	95	6	2	279	0	655	175	830
71 University of Texas.....	0	0	838	538	27	10	496	50	1,341	598	1,939
72 Agricultural and Mechanical College of Texas.	100	0	952	0	5	0	0	0	1,057	0	1,057
73 Agricultural College of Utah..	285	102	248	109	2	3	0	0	535	214	749
74 University of Utah.....	59	119	356	245	9	3	64	3	488	370	858
75 University of Vermont and Agricultural College.	0	0	258	59	0	1	196	0	454	60	514
76 Virginia Polytechnic Institute.	34	0	426	0	11	0	0	0	471	0	471
77 University of Virginia.....	0	0	440	0	35	0	270	0	725	0	725
78 Virginia Military Institute...	0	0	383	0	0	0	0	0	383	0	383
79 College of William and Mary (Va.).	114	0	110	0	0	0	0	0	224	0	224
80 State College of Washington...	136	2	718	361	9	0	0	0	863	363	1,226
81 University of Washington...	0	0	970	830	35	30	255	22	1,260	882	2,142
82 West Virginia University....	79	21	344	100	7	7	95	0	423	121	544
83 University of Wisconsin.....	0	0	2,356	1,024	260	87	181	4	2,899	1,200	4,099
84 University of Wyoming.....	37	40	59	67	3	5	0	0	108	134	242

and other State-aided institutions of higher education—Continued.

Enrolled only in summer school.		Enrolled in other short courses.		Enrollment by courses of study.								In professional departments.					
Men.	Women.	Men.	Women.	Classical and general culture.	General science.	Engineering.	Agriculture and horticulture.	Forestry.	Household economy.	Training courses for teachers.	Law.	Medicine.	Dentistry.	Pharmacy.	Veterinary surgery.		
13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28		
66 10	130 22	0 87	0 0	409 0	0 0	67 271	0 192	0 0	0 0	44 0	108 0	51 0	0 0	34 0	0 0		
128	116	289	0	0	46	35	40	0	84	5	0	0	0	31	0		
33	27	0	0	169	0	103	0	0	0	112	64	39	0	0	0		
0	0	0	0	49	138	131	0	0	0	0	0	0	0	0	0		
404	235	183	0	439	356	706	285	56	187	70	170	0	87	0	184		
156	439	0	0	0	0	45	0	0	0	0	92	63	0	55	0		
74	89	0	0	0	0	156	168	0	63	17	0	0	0	0	0		
67	199	622	162	0	66	156	168	0	63	17	0	0	0	0	0		
23	136	436	213	0	0	222	171	23	106	0	0	0	0	47	0		
26	54	0	0	514	0	138	0	0	0	0	185	74	0	0	0		
40	106	113	8	39	12	771	654	0	40	146	0	0	0	0	0		
242	346	0	0	1	0	0	0	0	0	191	0	0	0	0	0		
5	34	24	4	0	0	90	26	0	19	0	0	0	0	0	0		
						15											
0	0	19	0	0	0	307	77	0	0	0	0	0	0	0	0		
0	0	0	0	176	65	29	0	0	0	73	48	0	0	0	0		
13	85	66	10	37	37	45	47	0	34	0	0	0	0	23	0		
0	0	0	0	0	0	41	0	0	0	0	0	0	0	0	0		
0	0	0	0	157	67	34	0	0	0	35	82	7	0	0	0		
57	50	734	9	92	80	125	60	0	49	21	41	197	41	0	0		
294	468	0	0	0	0	13	0	0	0	396	285	178	0	51	0		
140	30	25	0	0	0	505	406	0	0	0	0	0	0	0	0		
31	72	195	22	0	75	0	148	0	73	0	0	0	0	0	0		
292	677	0	0	0	0	174	0	0	0	180	28	39	0	0	0		
0	0	0	0	83	0	133	60	0	6	2	0	196	0	0	0		
0	0	0	0	0	1	307	81	0	0	0	0	0	0	0	0		
0	0	0	0	344	0	96	0	0	0	0	191	79	0	0	0		
0	0	0	0	0	0	129	0	0	0	0	0	0	0	0	0		
0	0	0	0	110	0	0	0	0	0	41	0	0	0	0	0		
115	224	186	21	0	0	161	163	10	103	18	0	0	0	9	5		
103	203	58	0	1,184	0	466	0	87	45	16	206	0	0	71	0		
57	50	0	0	255	0	89	17	0	4	0	74	17	0	0	4		
466	363	609	0	0	0	763	369	0	100	425	130	8	0	47	1		
4	50	0	0	57	0	25	11	0	12	0	0	0	0	0	0		

TABLE 3.—*Property and income in State universities*

Names of institutions.	Property.						
	Bound volumes in libraries.	Approximate value of libraries.	Value of scientific apparatus, machinery, and furniture.	Value of live stock.	Value of grounds, including farm.	Value of buildings.	Endowment funds.
1	2	3	4	5	6	7	8
1 Alabama Polytechnic Institute.....	239,974	\$75,000	\$75,747	\$4,576	\$9,000	\$353,385	\$284,500
2 University of Alabama.....	20,000	60,000	137,000	.....	.....	.....	447,015
3 University of Arizona.....	16,500	33,000	70,630	1,545	33,000	207,310	10,500
4 University of Arkansas.....	15,420	41,000	165,000	5,000	25,000	350,000	.....
5 University of California.....	244,000	750,000	(2)	(2)	28,738,122	(3)	4,538,890
6 University of Colorado.....	56,000	75,000	152,000	500	180,000	700,000	60,000
7 State Agricultural College (Colo.).....	48,000	50,000	130,493	10,138	225,000	355,900	154,760
8 Colorado School of Mines.....	9,500	24,247	220,883	.....	68,939	425,671	.....
9 Connecticut Agricultural College.....	12,000	20,000	55,000	16,600	36,500	291,000	196,000
10 Delaware College.....	18,000	25,000	90,000	9,200	45,000	144,000	.....
11 University of Florida.....	12,500	14,000	65,000	4,000	15,000	220,000	219,650
12 Florida State College for Women.....	9,000	15,000	15,000	.....	20,000	175,000	.....
13 University of Georgia.....	36,000	42,000	89,200	10,010	475,000	500,000	370,202
14 Georgia School of Technology.....	7,000	20,000	125,000	0	155,000	265,000	.....
15 North Georgia Agricultural College.....	4,000	2,500	3,000	1,500	10,000	60,000	.....
16 College of Hawaii.....	8,650	16,500	.....	4,000	100,000	20,564	.....
17 University of Idaho.....	23,861	30,125	104,688	8,685	57,775	416,700	772,313
18 University of Illinois.....	188,186	380,000	1,399,283	22,152	410,000	2,093,500	647,342
19 Indiana University.....	85,000	88,000	21,250	.....	36,000	644,900	744,000
20 Purdue University (Ind.).....	29,867	55,000	290,000	16,000	120,000	1,025,000	340,000
21 Iowa State College of Agriculture and Mechanic Arts.....	32,500	115,000	333,942	53,943	147,798	1,704,762	686,690
22 Iowa State Teachers College.....	35,000	45,000	200,000	.....	10,000	900,000	.....
23 State University of Iowa.....	75,000	149,428	658,044	.....	870,330	1,650,992	373,344
24 University of Kansas.....	75,000	148,000	175,000	200	100,000	1,200,000	151,000
25 Kansas State Agricultural College.....	36,973	61,942	217,788	34,104	259,500	698,829	480,143
26 State University (Ky.).....	7,533	15,916	25,000	.....	275,000	250,000	144,075
27 Louisiana State University and Agricultural and Mechanical College.....	33,000	44,000	113,350	400	151,040	525,278	318,313
28 University of Maine.....	43,811	57,387	101,922	6,639	11,000	488,260	218,300
29 Maryland Agricultural College.....	6,000	8,500	70,000	1,280	30,000	340,000	50,797
30 Massachusetts Agricultural College.....	34,448	56,680	221,504	17,632	67,656	519,751	361,000
31 Massachusetts Institute of Technology.....	87,710	187,586	401,945	.....	708,200	628,800	1,891,627
32 University of Michigan.....	288,358	314,700	1,341,325	0	404,015	2,406,950	883,449
33 Michigan State Agricultural College.....	34,218	70,000	160,000	35,000	74,400	866,375	989,990
34 Michigan College of Mines.....	24,630	70,200	245,772	.....	.....	543,985	.....
35 University of Minnesota.....	150,000	475,000	700,000	40,000	1,834,000	3,021,000	1,448,799
36 Mississippi Agricultural and Mechanical College.....	25,428	34,818	334,307	45,792	80,000	589,850	240,037
37 University of Mississippi.....	25,000	25,000	48,000	650	75,000	400,000	.....
38 University of Missouri.....	114,134	172,628	408,918	25,406	534,237	1,225,148	1,264,839
39 Montana College of Agriculture and Mechanic Arts.....	11,300	20,000	99,500	8,750	74,000	279,500	324,755
40 Montana State School of Mines.....	8,000	5,000	75,000	.....	.....	194,000	.....
41 University of Montana.....	18,000	50,000	60,000	200	50,000	200,000	950,000
42 University of Nebraska.....	93,678	176,000	197,050	31,800	550,000	975,000	739,514
43 University of Nevada.....	19,500	43,046	100,167	8,225	83,892	422,636	196,500
44 New Hampshire College of Agriculture and Mechanic Arts.....	28,000	31,000	75,000	6,000	31,000	351,000	950,000
45 Rutgers College (N. J.).....	64,521	65,000	155,000	.....	175,000	675,000	701,029
46 New Mexico College of Agriculture and Mechanic Arts.....	13,676	38,668	89,828	5,492	107,900	93,825	.....
47 University of New Mexico.....	10,000	12,500	15,000	.....	10,000	90,000	.....
48 New Mexico School of Mines.....	5,200	9,000	10,500	.....	2,000	85,000	.....
49 Cornell University (N. Y.).....	395,209	771,397	1,269,383	.....	269,232	4,219,092	8,737,108
50 University of North Carolina.....	60,000	100,000	75,000	.....	70,000	553,000	206,237

¹ Includes appropriation for the experiment stations.

² Value of apparatus, machinery, live stock, buildings, all included under value of grounds.

³ For current expenses and building purposes.

and other State-aided institutions of higher education.

Income from—							Analysis of State appropriations.			
Student fees, excluding board and room rent.	Productive funds.	The State. ¹	United States Government. ¹	Private benefactions.	All other sources.	Total working income.	Mill-tax rate.	Receipts from mill tax.	Appropriation for current expenses.	Appropriation for building and permanent improvements.
9	10	11	12	13	14	15	16	17	18	19
\$13,590	\$21,490	\$40,000	\$54,628		\$25,237	\$154,945			\$66,000	\$50,000
24,361	3,000	116,000			59,097	202,458			42,050	11,500
4,658	1,020	53,550	75,000	\$2,000	3,319	139,547			147,900	0
9,660	3,900	147,900	62,727	528	19,221	243,936			149,829	44,848
130,421	203,382	1,025,558	75,000	104,906	146,456	1,672,716		\$710,774	30,000	45,000
43,000	5,000	235,000				284,000		160,000	44,486	8,383
	9,350	127,869	73,638		28,606	239,463		75,000	27,000	30,500
43,981		78,920			17,090	139,991		78,920	9,500	5,000
4,743	17,610	57,500	60,000		33,689	173,542			27,500	62,500
8,529	4,980	14,500	67,000		6,296	101,305			40,000	32,000
2,499	6,970	90,000	52,500	1,500	1,477	154,946			105,000	75,000
8,500	1,975	72,000				82,475			21,500	
12,449	25,314	105,000	30,000	7,978	8,739	189,480				
31,768	0	110,000	0	18,236	2,680	162,684				
1,500		21,500			2,000	25,000				
160		9,993	45,000		784	55,937			9,993	
	59,437	103,000	75,000		1,956	239,393			52,000	51,000
244,347	32,468	1,097,000	75,000		111,226	1,560,040			663,000	434,000
41,414	44,105	303,259			601	389,378		173,648	17,500	112,111
59,561	17,000	331,837	75,000		99,219	582,593		173,888	100,945	57,003
67,268	35,743	507,474	75,000		84,070	769,555		106,522	295,960	58,992
23,725		210,775			46,308	380,808			155,775	55,000
59,716	6,960	508,698			73,954	649,328		135,000	328,698	45,000
47,201	9,074	544,122			2,492	602,889			368,978	175,144
17,027	29,418	338,900	75,000		31,813	495,158			264,900	77,000
4,407	8,644	85,938	68,475		4,922	172,386		48,938	37,000	
10,626	14,556	124,000	51,917		11,358	215,458			124,000	
38,804	9,915	115,688	75,000		25,937	266,930			115,688	
0	5,797	34,000	75,000			146,919			34,000	
3,485	10,613	242,778	60,000		70,371	387,247			123,125	121,153
354,549	5,307	29,000	15,000	156,130	19,212	579,198			29,000	
339,542	56,463	659,287	0	231,612	350,720	1,637,624		650,287	9,000	
20,494	70,304	173,410	75,000		71,183	417,304		173,410		
27,872		65,000			8,737	101,608			65,000	
188,197	59,157	1,470,662	73,000		15,784	1,806,800		410,285	644,377	416,000
770	14,388	264,222	52,820	250	51,728	384,177			179,822	84,400
23,000	42,000	32,500	0	0	0	97,500			32,500	
20,963	61,160	638,330	72,187		57,747	853,394			463,630	174,700
8,496	21,218	53,466	75,000		12,601	170,781			53,466	
380		50,000				50,380			35,000	15,000
2,600	415	70,000		2,000		75,015			70,000	
71,303	42,250	480,900	75,000		58,929	728,442	1	385,960	35,000	60,000
4,108		176,565	75,000	6,000	5,133	276,807			121,565	55,000
6,406	40,130	9,460	75,000		38,665	170,661			3,000	6,460
21,744	41,313	48,892	75,000	39,146	46,028	272,120			32,836	16,055
1,644	1,083	17,036	75,000		11,932	106,675			17,036	
1,000	1,000	80,000			10,000	48,800			32,000	4,800
700		19,000				19,700			19,000	
469,141	438,488	280,433	75,000	329,025	189,483	1,781,945			280,433	
44,210	12,500	90,000			15,743	162,453			75,000	15,000

¹ Part of this money is used for the benefit of affiliated school of agriculture and the mechanic arts for negroes.

² Includes value of grounds.

TABLE 3.—*Property and income in State universities and*

		Property.						
	Names of institutions.	Bound vol- umes in li- braries.	Approx- imate value of li- braries.	Value of scientific appara- tus, ma- chinery, and fur- niture.	Value of live stock.	Value of grounds, includ- ing farm.	Value of build- ings.	Endow- ment funds.
	1	2	3	4	5	6	7	8
51	North Carolina College of Agri- culture and Mechanic Arts.	10,028	\$18,305	\$195,164	\$10,105	\$70,311	\$422,750	\$125,000
52	North Dakota Agricultural Col- lege.	22,800	26,500	130,000	14,000	65,000	512,000	978,587
53	State University and School of Mines (N. Dak.).	44,916	55,000	180,000	.....	118,000	490,000	1,680,000
54	Ohio University.....	35,000	40,000	146,000	.....	480,813	548,000	.....
55	Ohio State University.....	106,390	278,318	662,347	20,000	1,540,000	1,733,000	393,319
56	Miami University (Ohio).....	34,000	50,000	149,660	.....	50,000	555,000	108,000
57	University of Oklahoma.....	18,238	30,460	70,000	.....	75,000	307,500	.....
58	Oklahoma Agricultural and Mechanical College.	14,506	26,060	193,468	22,130	50,000	325,000	.....
59	Oregon State Agricultural Col- lege.	15,563	35,000	160,000	7,000	360,000	560,000	196,519
60	University of Oregon.....	35,000	60,000	129,152	.....	300,000	293,000	55,000
61	Pennsylvania State College.....	43,510	75,000	387,802	17,935	52,800	1,391,570	517,000
62	University of Porto Rico.....	3,729	8,000	17,749	11,219	36,068	67,439	534
63	Rhode Island State College.....	22,031	35,961	83,927	4,742	14,855	192,308	50,000
64	South Carolina Military Acad- emy.	5,450	10,000	25,000	.....	.....	³ 310,000	.....
65	Clemson Agricultural College (S. C.).	16,488	25,628	214,971	23,219	87,600	.....	154,439
66	University of South Carolina....	44,000	100,000	150,000	.....	275,000	450,000	.....
67	South Dakota Agricultural Col- lege.	12,500	36,000	47,000	12,000	65,000	300,000	136,738
68	South Dakota State School of Mines.	4,000	9,000	113,000	.....	15,000	85,000	.....
69	University of South Dakota....	18,000	37,500	120,000	50,000	.....	³ 350,000	.....
70	University of Tennessee.....	34,411	33,000	191,028	7,383	285,475	360,238	409,000
71	University of Texas.....	79,920	175,000	315,000	.....	147,000	1,181,000	2,080,000
72	Agricultural and Mechanical College of Texas.	20,000	25,000	174,455	19,710	48,320	928,000	205,000
73	Agricultural College of Utah....	19,470	15,513	66,693	13,758	25,200	333,000	147,441
74	University of Utah.....	33,040	42,000	153,100	.....	34,500	349,400	.....
75	University of Vermont and Agricultural College.	83,040	125,000	90,000	10,000	76,000	940,000	999,360
76	Virginia Polytechnic Institute..	12,400	8,000	125,000	.....	61,200	483,000	344,312
77	University of Virginia.....	75,000	100,000	115,500	800	600,000	1,209,000	1,583,792
78	Virginia Military Institute.....	16,227	20,000	100,000	.....	100,000	200,000	.....
79	College of William and Mary (Va.).	17,000	37,000	11,500	.....	50,000	147,500	173,000
80	State College of Washington....	28,156	40,195	144,549	14,668	115,900	1,008,793	517,238
81	University of Washington.....	43,793	99,534	349,138	750	1,059,000	1,086,441	3,000,000
82	West Virginia University.....	43,000	35,000	90,000	5,000	250,000	625,000	115,104
83	University of Wisconsin.....	169,602	387,022	715,919	30,508	1,804,549	2,722,074	659,349
84	University of Wyoming.....	30,000	60,000	159,000	9,000	110,000	300,000	31,500

¹ Includes appropriation for the experiment stations.² Includes appropriations for buildings.³ Includes value of grounds.

other State-aided institutions of higher education.—Continued.

Income from—							Analysis of State appropriations.			
Student fees, excluding board and room rent.	Productive funds.	The State. ¹	United States Government. ¹	Private benefactions.	All other sources.	Total working income.	Mill-tax rate.	Receipts from mill tax.	Appropriation for current expenses.	Appropriation for building and permanent improvements.
9	10	11	12	13	14	15	16	17	18	19
\$32,196	\$7,500	\$103,000	\$60,150	.....	\$34,437	\$237,283	.....	.....	² \$103,000	 51
4,560	58,514	175,315	75,000	.....	11,398	324,788	$\frac{1}{100}$	\$48,124	7,190	\$120,000 52
17,272	47,992	175,060	.....	.....	50,000	290,224	$\frac{3}{100}$	79,433	36,810	58,817 53
17,922	6,709	153,569	.....	.....	17,793	195,994	$\frac{1}{100}$	97,073	27,657	28,839 54
102,100	55,462	667,871	45,000	\$4,297	35,428	910,158	$\frac{1}{100}$	386,628	109,894	171,346 55
17,135	6,499	147,476	.....	2,313	580	193,571	$\frac{1}{100}$	79,399	51,725	16,352 56
4,937	19,312	253,495	.....	.....	.....	277,744	$\frac{2}{100}$	.....	128,495	125,000 57
5,000	28,448	235,628	70,500	.....	9,000	348,576	.....	.....	85,928	149,700 58
16,625	11,033	183,725	75,000	.....	6,433	292,816	.....	.....	78,725	105,000 59
7,250	9,239	125,000	.....	.....	.....	141,489	.....	.....	² 125,000	 60
45,388	31,020	265,500	75,000	.....	25,825	442,733	.....	.....	265,500	 61
.....	.....	80,301	45,000	.....	5,454	130,755	.....	.....	70,301	10,000 62
2,568	2,500	39,195	75,000	.....	.....	119,263	.....	.....	35,195	4,000 63
40,852	.....	80,000	.....	.....	.....	120,852	.....	.....	30,000	50,000 64
3,200	5,754	182,776	52,400	3,512	11,339	258,981	(⁴)	182,776	.....	..... 65
10,512	.....	93,263	.....	.....	6,950	110,725	.....	.....	67,069	26,194 66
7,223	29,857	59,979	75,000	.....	24,588	196,646	.....	.....	59,979	 67
2,415	3,170	28,000	.....	.....	.....	33,585	.....	.....	28,000	 68
15,100	11,591	112,500	.....	.....	619	139,810	.....	.....	80,500	32,000 69
56,090	26,604	56,745	75,000	41,972	11,718	268,129	(⁶)	56,268	.....	..... 70
29,521	157,878	295,000	.....	.....	1,143	483,542	.....	.....	295,000	 71
7,720	8,234	259,250	63,750	.....	25,875	364,828	.....	.....	86,000	172,350 72
8,609	10,659	87,350	75,000	.....	6,986	188,604	.....	.....	87,350	 73
15,215	27,142	162,796	.....	.....	.....	205,153	.....	.....	160,446	2,350 74
47,281	39,930	16,000	75,000	222,589	17,539	418,339	.....	.....	16,000	 75
26,479	20,659	71,000	60,000	.....	56,802	234,940	.....	.....	65,000	6,000 76
54,865	85,308	80,000	.....	5,000	11,600	246,770	.....	.....	80,000	 77
27,500	1,200	40,000	.....	1,000	.....	69,700	.....	.....	40,000	 78
5,059	8,048	55,495	.....	.....	354	68,946	.....	.....	40,495	15,000 79
15,000	29,000	277,268	75,000	.....	21,942	418,210	.....	.....	277,268	 80
15,567	.....	336,661	.....	30,000	.....	382,228	.....	.....	313,812	22,849 81
18,234	6,085	138,000	66,000	.....	20,922	249,241	.....	.....	138,000	 82
249,670	36,503	1,227,900	75,000	45,463	154,933	1,789,470	$\frac{2}{100}$	783,765	230,000	214,135 83
2,313	12,655	62,378	75,000	400	8,926	161,672	$\frac{1}{2}$	33,884	.....	28,493 84

⁴ Fertilizer tax.⁵ Part of this money is used for the benefit of affiliated schools of agriculture and the mechanic arts for negroes.⁶ One and three-fourths per cent of gross revenue of the State.

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UNITED STATES BUREAU OF EDUCATION
BULLETIN, 1911, NO. 19 WHOLE NUMBER 468

STATISTICS OF STATE UNIVERSITIES AND
OTHER INSTITUTIONS OF HIGHER
EDUCATION PARTIALLY SUP-
PORTED BY THE STATE

FOR THE YEAR ENDED
JUNE 30, 1911



WASHINGTON
GOVERNMENT PRINTING OFFICE
1912

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